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HOUSE OF REPRESENTATIVES
REPORT
102-41

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MULTIYEAR AUTHORIZATION ACT OF 1991

APRIL 25, 1991.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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Mr. BROWN, from the Committee on Science, Space, and Technology, submitted the following

REPORT

[To accompany H.R. 1988]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 1988) to authorize appropriations to the National Aeronautics and Space Administration for research and development, space flight, control, and data communications, construction of facilities, research and program management, and Inspector General, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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The amendment is as follows:

Strike out all after the enacting clause and insert in lieu thereof the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Aeronautics and Space Administration Multiyear Authorization Act of 1991".

SEC. 2. FINDINGS.

Congress finds that—

(1) the report of the Advisory Committee on the Future of the United States Space Program has provided a framework within which a consensus on the goals of the space program can be developed;

(2) a balanced civil space science program should be funded at a level of at least 20 percent of the aggregate amount in the budget of the National Aeronautics and Space Administration for "research and development" and "space flight, control, and data communications";

(3) development of an adequate data base for life sciences in space will be greatly enhanced through closer scientific cooperation with the Soviet Union, including active use of manned Soviet space stations;

(4) the space program can make substantial contributions to health-related research and should be an integral part of the Nation's health research and development program;

(5) Landsat data and the continuation of the Landsat system beyond Landsat 6 are essential to the Mission to Planet Earth and other long-term environmental research programs;

(6) increased use of defense-related remote sensing data and data technology by civilian agencies and the scientific community can benefit national environmental study and monitoring programs;

(7) the generation of trained scientists and engineers through educational initiatives and academic research programs outside of the National Aeronautics and Space Administration is essential to carrying out a long-term Space Exploration Initiative;

(8) policies which restrict the use of foreign launch capabilities for United States Government satellites should apply only where adequate United States launch capabilities exist;

(9) the strengthening and expansion of the Nation's space transportation infrastructure, including the enhancement of launch sites and launch site support facilities, is essential to support the full range of the Nation's space-related activities;

(10) the aeronautical program contributes to the Nation's technological competitive advantage, and it has been a key factor in maintaining preeminence in aviation over many decades; and

(11) the National Aero Space Plane program can have benefits to the military and civilian aviation programs from the new and innovative technolgies developed in propulsion systems, aerodynamics, and control systems that could be enormous, especially for high-speed aeronautical and space flight.

SEC. 3. POLICY.

It is the policy of the United States that—

(1) the Administrator of the National Aeronautics and Space Administration, in planning for national programs in environmental study and human space flight and exploration, should ensure the resiliency of the space infrastructure;

(2) a stable and balanced program of civil space science should be planned to minimize future year funding requirements in order to accommodate a steady stream of new initiatives;

(3) any new launch system undertaken or jointly undertaken by the National Aeronautics and Space Administration should be based on defined mission and program requirements or national policies established by Congress;

(4) in fulfilling the mission of the National Aeronautics and Space Administration to improve the usefulness, performance, speed, safety, and efficiency of space vehicles, the Administrator should establish a program of research and development to enhance the competitiveness and cost effectiveness of commercial expendable launch vehicles; and

(5) the National Aeronautics and Space Administration should promote and support efforts to advance scientific understanding by conducting or otherwise providing for research on environmental problems, including global change, ozone depletion, acid precipitation, deforestation, and smog.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

(a) AUTHORIZATIONS.—There are authorized to be appropriated to the National Aeronautics and Space Administration the following amounts:

(1) For "research and development", for the following programs:

(A) United States International Space Station Freedom, $1,900,000,000 for fiscal year 1992, of which $25,000,000 shall be for the development of an Assured Crew Return Vehicle, with an additional $128,900,000 authorized upon the submission of a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on an independent engineering review of the Space Station restructuring by the Aeronautics and Space Engineering Board of the National Research Council.

(B) Space transportation capability development, $679,800,000 for fiscal year 1992, $799,800,000 for fiscal year 1993, and $847,400,000 for fiscal year 1994. Of such amounts authorized for fiscal year 1992, $30,000,000 shall be made available for propulsion technology development, and $20,000,000 shall be made available for technology development of other launch technologies, including single stage to orbit vehicles.

(C) Physics and astronomy, $1,096,600,000 for fiscal year 1992, of which $6,000,000 shall be made available for carrying out scientific programs which have otherwise been eliminated from the Space Station, $1,321,400,000 for fiscal year 1993, and $1,308,500,000 for fiscal year 1994.

(D) Life sciences, $183,900,000 for fiscal year 1992, $224,000,000 for fiscal year 1993, and $246,100,000 for fiscal year 1994.

(E) Planetary exploration, $299,300,000 for fiscal year 1992, $251,900,000 for fiscal year 1993, and $263,400,000 for fiscal year 1994.

(F) Earth science and applications—

(i) $725,600,000 for fiscal year 1992, of which—

(I) $5,000,000 shall be made available only for the purchase of Landsat data for global change research;

(II) $5,000,000 shall be made available for the purchase of long-lead parts for a follow-on to Landsat 6; and

(III) $1,000,000 shall be made available for remote sensing data conversion; and

(ii) $830,000,000 for fiscal year 1993; and

(iii) $950,500,000 for fiscal year 1994.

(G) Materials processing in space, $115,800,000 for fiscal year 1992, $201,400,000 for fiscal year 1993, and $233,600,000 for fiscal year 1994.

(H) Communications, $39,400,000 for fiscal year 1992, $34,700,000 for fiscal year 1993, and $31,100,000 for fiscal year 1994.

(I) Information systems, $42,000,000 for fiscal year 1992.

(J) Technology utilization, $27,000,000 for fiscal year 1992, $29,700,000 for fiscal year 1993, and $33,000,000 for fiscal year 1994.

(K) Commercial use of space, $107,000,000 for fiscal year 1992, $138,200,000 for fiscal year 1993, and $134,400,000 for fiscal year 1994.

(L) Aeronautical research and technology, $591,200,000 for fiscal year 1992, $670,500,000 for fiscal year 1993, and $716,000,000 for fiscal year 1994.

(M) Transatmospheric research and technology, $72,000,000 for fiscal year 1992, $120,000,000 for fiscal year 1993, and $145,000,000 for fiscal year 1994.

(N) Space research and technology, $314,800,000 for fiscal year 1992, $321,700,000 for fiscal year 1993, and $317,200,000 for fiscal year 1994.

(O) Exploration activities, $61,000,000 for fiscal year 1992, $88,000,000 for fiscal year 1993, and $102,400,000 for fiscal year 1994.

(P) Safety, reliability, and quality assurance, $33,600,000 for fiscal year 1992, $32,500,000 for fiscal year 1993, and $34,000,000 for fiscal year 1994.

(Q) University Space Science and Technology Academic Program, $64,600,000 for fiscal year 1992, $70,500,000 for fiscal year 1993, and $74,500,000 for fiscal year 1994.

(R) Tracking and data advanced systems, $22,000,000 for fiscal year 1992, $23,200,000 for fiscal year 1993, and $24,600,000 for fiscal year 1994.

(2) For "space flight, control, and data communications" for the following programs:

(A) Space Shuttle Production and Operational Capability, $1,358,900,000 for fiscal year 1992, of which $375,000,000 shall be made available for the Advanced Solid Rocket Motor program, $1,277,000,000 for fiscal year 1993, and $1,210,500,000 for fiscal year 1994.

(B) Space Shuttle Operations, $2,970,600,000 for fiscal year 1992, $2,968,800,000 for fiscal year 1993, and $2,897,200,000 for fiscal year 1994.

(C) Launch Services, $315,900,000 for fiscal year 1992, $289,000,000 for fiscal year 1993, and $359,800,000 for fiscal year 1994. Of such amounts, $10,000,000 in fiscal year 1992, $30,000,000 in fiscal year 1993, and $50,000,000 in fiscal year 1994 shall be made available for carrying out a program of component technology development, validation, and demonstration directed at commercial launch vehicle competitiveness.

(D) Space and ground networks, communications, and data systems, $920,873,000 for fiscal year 1992, $1,066,000,000 for fiscal year 1993, and $1,077,500,000 for fiscal year 1994.

(3) For "construction of facilities", including land acquisition, for fiscal year 1992 as follows:

(A) Construction of Space Station Processing Facility, Kennedy Space Center, $35,000,000.

(B) Modification for Earthquake Protection, Downey/Palmdale, CA, Johnson Space Center, $4,400,000.

(C) Modifications for Safe Haven, Vehicle Assembly Building, High-Bay 2, Kennedy Space Center, $7,500,000.

(D) Rehabilitation of Crawlerway, Kennedy Space Center, $3,000,000.

(E) Restoration of Shuttle Landing Facility Shoulders, Kennedy Space Center, $4,000,000.

(F) Restoration of the High Pressure Gas Facility, Stennis Space Center, $6,500,000.

(G) Construction of Addition for Flight Training and Operations, Johnson Space Center, $13,000,000.

(H) Construction of Advanced Solid Rocket Motor Program Facilities (various locations), $100,000,000.

(I) Modernization of Industrial Area Chilled Water System, Kennedy Space Center, $4,000,000.

(J) Rehabilitation and Expansion of Communications Duct Banks, Kennedy Space Center, $1,400,000.

(K) Replace 15 KV Load Break Switches, Kennedy Space Center, $1,300,000.

(L) Repair Site Water System, White Sands Test Facility, $1,300,000.

(M) Replace Central Plant Chillers and Boiler, Johnson Space Center, $5,700,000.

(N) Modifications to X-Ray Calibration Facility (XRCF), Marshall Space Flight Center $5,200,000.

(O) Restoration and Modernization of High Voltage Distribution System, Goddard Space Flight Center, $7,000,000.

(P) Construction of Earth Observing System Data Information System Facility, Goddard Space Flight Center, $17,000,000.

(Q) Modernization of Main Electrical Substation, Jet Propulsion Laboratory, $5,500,000.

(R) Restoration of Utilities, Wallops Flight Facility, $3,500,000.

(S) Construction of Data Interface Facility, White Sands Test Facility, $4,000,000.

(T) Rehabilitation of Tracking and Data Relay Satellite System (TDRSS) Ground Terminal, White Sands Test Facility, $5,700,000.

(U) Repair of facilities at various locations, not to exceed $1,000,000 per project, $31,700,000.

(V) Rehabilitation and modification of facilities at various locations, not to exceed $1,000,000 per project, $34,800,000.

(W) Minor construction of new facilities and additions to existing facilities at various locations, not to exceed $750,000 per project, $12,900,000.

(X) Environmental compliance and restoration, $36,000,000.

(Y) Facility planning and design, not otherwise provided for, $34,000,000.

(Z) Repair and modernization of the 12-foot Pressure Wind Tunnel, Ames Research Center, $25,000,000.

(AA) Upgrade of Outdoor Aerodynamic Research Facility, Ames Research Center, $3,300,000.

(BB) Modernization of 16-foot Transonic Tunnel, Langley Research Center $3,400,000.

(CC) Modifications to the High Pressure Air System, Langley Research Center, $11,700,000.

(DD) Rehabilitation of Central Air System, Lewis Research Center, $5,600,000.

(EE) Rehabilitation of Icing Research Tunnel, Lewis Research Center, $2,600,000.

Notwithstanding the amounts authorized in subparagraphs (A) through (EE), the total amount authorized by this paragraph shall not exceed $430,300,000.

(4) For "research and program management", $2,422,300,000 for fiscal year 1992.

(5) For "Inspector General", $14,600,000 for fiscal year 1992, $15,300,000 for fiscal year 1993, and $15,700,000 for fiscal year 1994.

(b) LIMITATIONS.—(1)(A) Notwithstanding paragraph (4), appropriations authorized under this section for "research and development" and "space flight, control, and data communications" may be used—

(i) for any items of a capital nature (other than acquisition of land) which may be required at locations other than installations of the National Aeronautics and Space Administration for the performance of research and development contracts; and

(ii) for grants to nonprofit institutions of higher education, or to nonprofit organizations whose primary purpose is the conducting of scientific research, for purchase or construction of additional research facilities.

Title to facilities described in clause (ii) shall be vested in the United States unless the Administrator determines that the national program of aeronautical and space activities will best be served by vesting title in any such grantee institution or organization. Each such grant shall be made under such conditions as the Administrator shall determine to be required to ensure that the United States will receive therefrom benefit adequate to justify the making of that grant.

(B) None of the appropriations authorized under this section for "research and development" and "space flight, control, and data communications" may be used in accordance with this paragraph for the construction of any facility, the estimated

cost of which, including collateral equipment, exceeds $750,000, unless the Administrator has notified the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate of the nature, location, and estimated cost of such facility.

(2) Appropriations authorized under this section for "research and development", for "space flight, control, and data communications", or for "construction of facilities" may remain available until expended. Appropriations authorized under this section for "research and program management" for maintenance and operation of facilities, and for other services, shall remain available through the next fiscal year after the fiscal year for which such amount is appropriated.

(3) Not to exceed $35,000 of appropriations authorized under this section for "research and program management" may be used for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator, and the Administrator's determination shall be final and conclusive upon the accounting officers of the Government.

(4)(A) Except as provided in paragraph (1)(A), appropriations authorized under this section for "research and development", "space flight, control, and data communications", or "research and program management" may be used for the construction of new facilities and additions to, or repair, rehabilitation, or modification of existing facilities, but only if the cost of each such project, including collateral equipment, does not exceed $200,000.

(B) Except as provided in paragraph (1)(A), appropriations authorized under this section for "research and development" or "space flight, control, and data communications" may be used for unforeseen programmatic facility project needs, but only if the cost of each such project need, including collateral equipment, does not exceed $750,000.

(C) Appropriations authorized under this section for "research and program management" may be used for repair, rehabilitation, or modification of existing facilities controlled by the General Services Administration, but only if the cost of each such project, including collateral equipment, does not exceed $500,000.

SEC. 5. CONSTRUCTION OF FACILITIES REPROGRAMMING.

Appropriations authorized under section 4(a)(3)(A) through (EE)—

(1) may be varied upward 10 percent, in the discretion of the Administrator or the Administrator's designee; or

(2) following a report by the Administrator or the Administrator's designee to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the particular circumstances, may be varied upward 25 percent to meet unusual cost variations.

The total amount of appropriations authorized under section 4(a)(3)(A) through (EE) shall not be increased as a result of actions taken under paragraphs (1) and (2) of this section.

SEC. 6. SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES.

Where the Administrator determines that new developments or scientific or engineering changes in the national program of aeronautical and space activities have occurred; and that such changes require the use of additional funds for the purposes of construction, expansion, or modification of facilities at any location; and that deferral of such action until the enactment of the next authorization Act would be inconsistent with the interest of the Nation in aeronautical and space activities; the Administrator may transfer not to exceed one-half of 1 percent of the funds appropriated pursuant to section 4(a)(1) or (2) to the "construction of facilities" appropriation for such purposes. The Administrator may also use up to $10,000,000 of the amounts authorized under section 4(a)(3) for such purposes. The funds so made available pursuant to this section may be expended to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site preparation, appurtenances, utilities, and equipment. No such funds may be obligated until a period of 30 days has passed after the Administrator or the Administrator's designee has transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a written report describing the nature of the construction, its cost, and the reasons therefor.

SEC. 7. CONSIDERATION BY COMMITTEES.

Notwithstanding any other provision of this Act—

(1) no amount appropriated pursuant to this Act may be used for any program deleted by the Congress from requests of the Administrator as originally

made to either the Committee on Science, Space, and Technology of the House of Representatives or the Committee on Commerce, Science, and Transportation of the Senate;

(2) no amount appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for that particular program by section 4(a)(1), (2), and (4); and

(3) no amount appropriated pursuant to this Act may be used for any program which has not been presented by the Administrator to either such committee,

unless a period of 30 days has passed after the receipt by each such committee of notice given by the Administrator containing a full and complete statement of the action proposed to be taken and the facts and circumstances relied upon in support of such proposed action. The National Aeronautics and Space Administration shall keep the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate fully and currently informed with respect to all activities and responsibilities within the jurisdiction of those committees. Any Federal department, agency, or independent establishment shall furnish any information requested by either committee relating to any such activity or responsibility.

SEC. 8. SMALL BUSINESS INNOVATION RESEARCH PROGRAM.

The Administrator may utilize up to 5 percent of the funds provided for the Small Business Innovation Research Program pursuant to section 4(f) of the Small Business Innovation Development Act of 1982, for program management and promotional activities.

SEC. 9. OFFICE OF FACILITIES MAINTENANCE.

The Administrator shall create an Office of Facilities Maintenance, which shall have complete authority to plan and direct facilities maintenance management for all National Aeronautics and Space Administration sites.

SEC. 10. COMMERCIAL SPACE LAUNCH ACT AMENDMENT.

Section 24 of the Commercial Space Launch Act (49 U.S.C. App. 2623) is amended by adding at the end thereof the following: "There are authorized to be appropriated to the Secretary to carry out this Act $5,104,000 and such additional sums as may be necessary, not to exceed $20,000,000, to ensure the resiliency of the Nation's space infrastructure, for fiscal year 1992.".

SEC. 11. NATIONAL SPACE COUNCIL AUTHORIZATION.

(a) There are authorized to be appropriated to carry out the activities of the National Space Council established by section 501 of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471), $1,491,000 for fiscal year 1992, of which not more than $1,000 shall be available for official reception and representation expenses. The National Space Council shall reimburse other agencies for not less than one-half of the personnel compensation costs of individuals detailed to it.

(b) It is the sense of Congress that the National Space Council, in coordination with the Committee on Earth and Environmental Sciences, should, by October 1, 1991, establish policy recommendations for carrying out the President's commitment to maintaining the continuity of Landsat data, including plans and programs for a succesor to Landsat 6, organizational options and recommendations for acquiring Landsat data for global change research, national security, environmental management, and other governmental purposes, and options and recommendations for encouraging the use of Landsat data by commercial firms and development of the commercial market for such data.

SEC. 12. OFFICE OF SPACE COMMERCE AUTHORIZATION.

There are authorized to be appropriated to the Secretary of Commerce for the Office of Space Commerce $491,000 for fiscal year 1992.

SEC. 13. AMENDMENT OF PUBLIC LAW 100-147.

Section 107(a) of the National Aeronautics and Space Administration Authorization Act of 1988 (P.L. 100-147) is amended—

(1) by inserting ", in both then year and constant dollars," after "estimated cost";

(2) by inserting "assembly (including related costs);" after "construction of facilities;"; and

(3) by adding at the end the following new sentence: "Each such plan shall also include the estimated cost, in both then year and constant dollars, of operations for at least the first full year of steady operations of the space station.".

SEC. 14. MULTIYEAR CONTRACTING.

Along with submission to Congress of the National Aeronautics and Space Administration fiscal year 1993 budget request, the Administrator shall—

(1) present a study which assesses the usefulness of granting similar authority as under section 2306(h) of title 10, United States Code, to the National Aeronautics and Space Administration; and

(2) recommend no less than 5 candidate programs to be considered by Congress for multiyear contracting.

SEC. 15. BUY AMERICA PROVISIONS.

(a) RESTRICTIONS ON CONTRACT AWARDS.—No contract or subcontract made with funds authorized under this Act may be awarded for the procurement of an article, material, or supply produced or manufactured in a foreign country whose government unfairly maintains in government procurement a significant and persistent pattern or practice of discrimination against United States products or services which results in identifiable harm to United States businesses, as identified by the President pursuant to subsection (g)(1)(A) of section 305 of the Trade Agreements Act of 1979 (19 U.S.C. 2515(g)(1)(A)). Any such determination shall be made in accordance with such section 305.

(b) PROHIBITION AGAINST FRAUDULENT USE OF "MADE IN AMERICA" LABELS.—If it has been finally determined by a court or Federal agency that any person intentionally affixed a label bearing a "Made in America" inscription, or an inscription with the same meaning, to any product sold in or shipped to the United States that is not made in the United States, that person shall be ineligible to receive any contract or subcontract from the National Aeronautics and Space Administration, pursuant to the debarment, suspension, and ineligibility procedures in subpart 9.4 of chapter 1 of title 48, Code of Federal Regulations.

(c) BUY AMERICAN REQUIREMENT.—(1) The Administrator is authorized to award to a domestic firm a contract for the purchase of goods that, under the use of competitive procedures, would be awarded to a foreign firm, if—

(A) the final product of the domestic firm will be completely assembled in the United States;

(B) when completely assembled, more than 50 percent of the final product of the domestic firm will be domestically produced; and

(C) the difference between the bids submitted by the foreign and domestic firms is not more than 6 percent.

(2) This subsection shall not apply to the extent to which—

(A) in the opinion of the Administrator, after taking into consideration international obligations and trade relations, such applicability would not be in the public interest;

(B) in the opinion of the Administrator, after consultation with the Secretary of Defense, compelling national security considerations require otherwise; or

(C) the President determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(3) This subsection shall apply only to contracts made for which—

(A) amounts are authorized by this Act to be made available; and

(B) solicitations for bids are issued after the date of enactment of this Act.

(4) The Administrator, before January 1, 1993, shall report to the Congress on contracts covered under this subsection—

(A) entered into with foreign firms pursuant to a determination made under paragraph (2) of this subsection; and

(B) awarded to domestic firms pursuant to paragraph (1) of this subsection, in fiscal years 1991 and 1992.

(5) For the purposes of this subsection—

(A) the term "domestic firm" means a business entity that is incorporated in the United States and that conducts business operations in the United States; and

(B) the term "foreign firm" means a business entity not described in subparagraph (A).

SEC. 16. QUALITY ASSURANCE PERSONNEL.

(a) EXCLUSION OF NASA PERSONNEL.—A person providing articles to the National Aeronautics and Space Administration under a contract entered into after the date

of enactment of this Act may not exclude National Aeronautics and Space Administration quality assurance personnel from work sites except as provided in a contract provision described in subsection (b).

(b) CONTRACT PROVISIONS.—The National Aeronautics and Space Administration shall not enter into any contract which permits the exclusion of National Aeronautics and Space Administration quality assurance personnel from work sites unless the Administrator has submitted a copy of the provision permitting such exclusion to the Congress at least 60 days before entering into such contract.

SEC. 17. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ENDEAVOR TEACHER FELLOWSHIP TRUST FUND.

(a) ESTABLISHMENT.—There is established in the Treasury of the United States, in tribute to the dedicated crew of the Space Shuttle Challenger, a trust fund to be known as the "National Aeronautics and Space Administration Endeavor Teacher Fellowship Trust Fund" (hereafter in this section referred to as the "Trust Fund"). The Trust Fund shall consist of gifts and donations accepted by the National Aeronautics and Space Administration pursuant to section 208 of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2476b), as well as other amounts which may from time to time, at the discretion of the Administrator, be transferred from the National Aeronautics and Space Administration Gifts and Donations Trust Fund.

(b) INVESTMENT OF TRUST FUND.—The Administrator shall direct the Secretary of the Treasury to invest and reinvest funds in the Trust Fund in public debt securities with maturities suitable for the needs of the Trust Fund, and bearing interest at rates determined by the Secretary of the Treasury, taking into consideration the current average market yield on outstanding marketable obligations of the United States of comparable maturities. Interest earned shall be credited to the Trust Fund.

(c) PURPOSE.—Income accruing from the Trust Fund principal shall be used to create the National Aeronautics and Space Administration Endeavor Teacher Fellowship Program. Such program shall award fellowships to selected United States nationals who are undergraduate students pursuing a course of study leading to certified teaching degrees in elementary education or in secondary education in mathematics, science, or technology disciplines. Awards shall be made pursuant to standards established for the fellowship program by the Administrator.

INTRODUCTION

Over the next decade, the substantive efforts of the space program will be directed toward preparing a space infrastructure to carry out major initiatives in environmental study and human exploration. This infrastructure will include a system of Earth observing platforms together with a data management system, a manned Space Station, and a space transportation system. The Committee's review of the budget request for fiscal year 1992 and succeeding years has been carried out with the intent of ensuring that this infrastructure is resilient and based on a sound long range strategy.

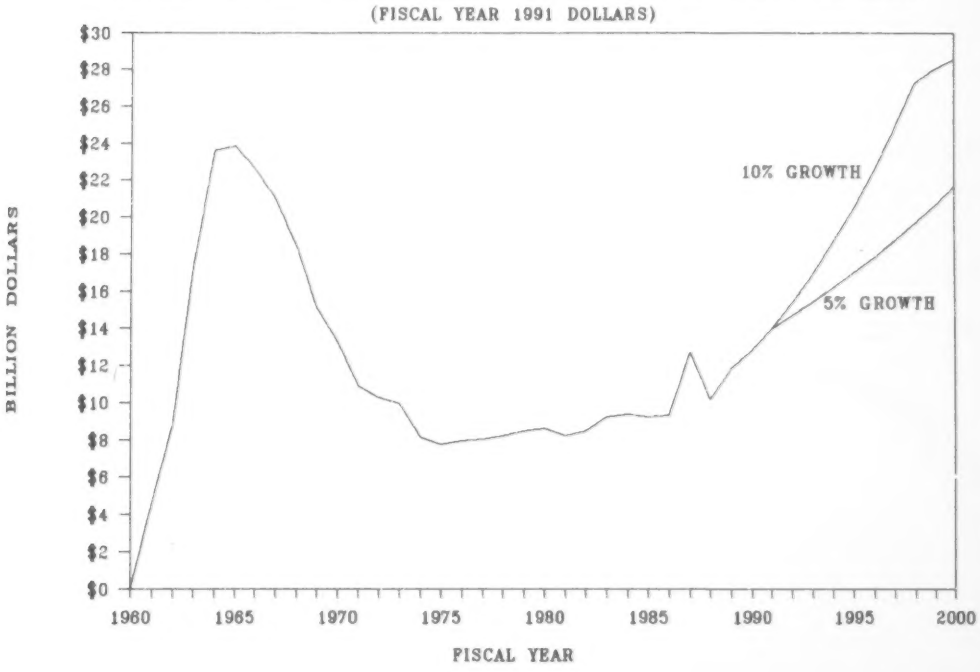
Concurrent with this infrastructure development, NASA intends to execute a science strategic plan made up of large, intermediate, and small missions together with programs designed to utilize and enhance man related elements of the space program. The Committee's efforts have been directed at ensuring the stability of this strategic plan in a budgetary context and its responsiveness to broader scientific needs.

The Committee's consideration of the NASA request this year has also been carried out within the framework of the Report of the Advisory Committee on the Future of the U.S. Space Program. This report has provided a strong basis for developing a consensus on the long range goals and directions for the space program. As established in this report, such a consensus does not now exist and has been lacking since the Apollo program. As a result, the under-

lying rationale for the space program in the present budgetary, social, and political environment has received no serious consideration in nearly two decades and space policy has largely resulted from specific hardware initiatives and budgetary influences. Thus, ambitious extensions of the space program including renewed human exploration initiatives and major environmental monitoring efforts, should rightfully be reconsidered and based on a full understanding of the contemporary role of science and technology in the National agenda.

Key to sustaining the robust and balanced space program recommended by the Advisory Committee report is a consensus on a long-range stable and increasing budget. The budgetary growth recommended by the Report, an annual increase of 10 percent real growth, will lead to a doubling of the NASA budget before the year 2000 at which time the NASA budget will reach a level of 0.4 percent of the GNP. This approximates the average share of the GNP allcoated to the space program during the Apollo era.

FIGURE 1. GROWTH ENVELOPE FOR NASA



Although this specific budget growth may be difficult to sustain over a long period, the Committee believes that some such steady commitment of at least half that growth rate is essential to expanding the space program beyond its present dimensions. If such a budget growth does not materialize and the space program remains at or near its present level, the present balance between science and infrastructure development and the long range intent of the manned program will need to be seriously reconsidered.

The Committee has provided a multiyear authorization for NASA's major programs in order to more realistically establish their budgetary requirements and has also developed guidelines in

critical policy areas. A summary of major provisions of the H.R. 1988 is as follows:

Full funding for the Space Station has been provided, with some of the funding to be used for development of an Assured Crew Return Vehicle and some of the funding contingent on the delivery of a report on an independent engineering review of the Space Station restructuring.

Sustaining funding for a new launch system has been provided with funding focused on propulsion technology development and the development of other technologies, including singe stage to orbit vehicles.

General reductions have been applied in certain Space Transportation Capability Development programs with a view of restoring these funds in future fiscal years as their needs become better defined.

Funding for AXAF has been reduced without prejudice.

Funding has been provided for alternative flight programs for those attached payloads that were deleted from the Station.

Funding has been provided for life science activities on the Soviet Mir Space Station.

Funding has been provided for the Lifesat new start, however, program growth in fiscal years 1992 and 1994 has been slowed.

The rate of increase in funding for the Earth Observing System has been reduced pending completion of the current technical review.

Funding has been added for Earth probes, classified remote sensing data conversion, and the Earth science data analysis activities which were deferred in fiscal year 1991.

Funding has been provided for the purchase of Landsat data for Global Change research and for the purchase of long-lead parts for a follow-on to Landsat 6.

Funding for Materials Processing in Space has been reduced based on the need to develop alternative flight programs for deleted Station attached payloads and also the need to better define the role of Station materials processing facilities.

The rate of increase in funding for Commercial Use of Space has been reduced without prejudice.

The rate of increase in funding for Technology Utilization has been reduced.

In lieu of a Flight Telerobotic Servicer program, an automation and robotics technology program has been established emphasizing teleoperated Space Station payload technologies and micro rover technologies for planetary exploration.

A general reduction in Exploration Activities has been made without prejudice. The Committee reaffirms its strong support for a sustained Exploration program.

Funding has been augmented for the Advanced Solid Rocket Motor program in order to allow it to support the Space Station requirements and schedule.

Funding has been augmented to maintain an active Shuttle structural spares and Shuttle production support program.

Work on the "glass cockpit" within the Assured Shuttle Availability Program has been reduced.

Funding for two future Shuttle flights has been eliminated and one Shuttle flight has been delayed.

Overall funding for Shuttle Operations has been reduced in anticipation of greater management and program efficiencies.

A program of component technology development has been established in order to assist the commercial launch vehicle industry.

Funding for expendable launch vehicle services for MSAT has been deleted pending clearer definition of the role of the MSAT consortium and funding was further reduced to reflect expected savings on a Titan IV.

A general reduction has been made to the Space and Ground Networks, Communications, and Data Systems program.

Funds from the construction of the ASRM facility have been applied to the ASRM development program.

A general reduction has been made to the Research and Program Management account.

The sense of Congress has been expressed that the National Space Council should develop policy recommendations for the follow-on program to Landsat 6.

Purpose of the Bill

The purpose of the bill is to authorize appropriations to the National Aeronautics and Space Administration (NASA) for fiscal years 1992, 1993, and 1994, and to the Department of Transportation Office of Commercial Space Transportation, the Department of Commerce Office of Space Commerce, and the National Space Council within the Executive Office of the President. The bill also sets forth special policy provisions and authorities in order to carry out the activities of the civil space program. In summary, the bill provides the following budget authority:

AMOUNT OF NEW BUDGET AUTHORITY

[Millions of Dollars]

	Fiscal year—		
	1992	1993	1994
National Aeronautics and Space Administration	$14,938.0	$10,773.6	$11,022.4
Department of Transportation Office of Commercial Space Transportation	5.1		
Department of Commerce Office of Space Commerce	.05		
National Space Council	1.5		

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET SUMMARY

[In millions of dollars]

	Fiscal year 1991	Fiscal year 1992 authorization		Fiscal year 1993 authorization		Fiscal year 1994 authorization	
		Presidents request	House authorization	Presidents estimate	House authorization	Presidents estimate	House authorization
Research and development	6,023.6	7,198.5					
Space Station	1,900.0	2,028.9	2,028.9	2,426.0		2,790.8	
Space Transportation Capability Development	602.5	879.8	679.8	999.8	799.8	997.4	847.4
Upper Stages	82.2	108.5	(−20)				
Spacelab	129.3	150.2	(−10)				
Engineering and Technical Base	208.5	235.2	(−15)				
Payload Operations and Supply Equipment	101.5	144.5	(−15)				
Tethered Satellite System	21.9	12.6					
Advanced Programs	35.2	53.8	(−15)				
New Launch System	23.9	175.0	(−125)		(−200)		(−150)
Space Science and Applications	2,429.6	2,934.6					
Physics and Astronomy	975.1	1,140.6	1,096.6	1,321.4	1,321.4	1,308.5	1,308.5
Gamma Ray Observatory Development	22.0	0.0					
Advanced X-Ray Astrophysics Facilities	101.2	211.0	(−38)				
Global Geospace Science	96.6	65.3					
Shuttle/Spacelab Payload Mission Management	88.8	88.0					
Space Station Utilization	3.0	0.0					
Payload and Instrument Development	94.6	115.9	(+6)				
Explorer Development	99.8	107.9					
Mission Operation and Data Analysis	313.3	388.4					
Research and Analysis	100.8	103.1	(−12)				
Suborbital Program	55.0	61.0					
Life Sciences	138.0	183.9	183.9	284.0	224.0	326.1	246.1
Human Space Flight and System Engineering	81.1	89.7					
Research and Analysis	56.9	79.2					
Lifesat	(2.0)	15.0			(−60)		(−80)
Planetary Exploration	457.1	627.3	299.3	635.3	251.9	643.5	263.4
Ulysses Development	3.0	0.0					
Mars Observer	78.5	54.4					
Mars Balloon Relay Experiment	1.5	1.2					
CRAF/Cassini	145.0	328.0	[328.0]		[383.4]		[380.1]
Mission Operations and Data Analysis	161.2	150.5					
Research and Analysis	67.9	93.2					

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET SUMMARY—Continued

[In millions of dollars]

	Fiscal year 1991	Fiscal year 1992 authorization		Fiscal year 1993 authorization		Fiscal year 1994 authorization	
		Presidents request	House authorization	Presidents estimate	House authorization	Presidents estimate	House authorization
Space Applications	859.4	982.8					
Earth Science and Applications	667.9	775.6	725.6	1,108.0	830.0	1,562.5	950.5
Earth Observing System	191.0	336.0	(−75)		(−278)		(−612)
Earth Probes	54.7	68.2	(+10)				
Remotely Piloted Aircraft	0.0	5.0					
Upper Atmosphere Research Satellite	64.0	18.2					
Ocean Topography Experiment	76.0	51.9					
Payload and Instrument Development	49.7	48.6	(+5)				
Missions Operations and Data Analysis	39.4	56.3	(+5)				
Research and Analysis	193.1	191.4	(+5)				
Materials Processing	102.3	125.8	115.8	201.4	201.4	233.6	233.6
Communications	52.5	39.4	39.4	34.7	34.7	31.1	31.1
Information Systems	36.7	42.0	42.0	0.0	0.0	0.0	0.0
Commercial Programs	86.0	150.0					
Technology Utilization	24.4	32.0	27.0 (−5)	31.7	29.7 (−2)	33.0	33.0
Commercial Use of Space	61.6	118.0	107.0 (−11)	144.2	138.2 (−6)	137.4	134.4 (−3)
Aeronautical Research and Technology	512.0	591.2	591.2	670.5	670.5	716.0	716.0
Transatmospheric Research and Technology (NASP)	95.0	72.0	72.0	120.0	120.0	145.0	145.0
Space Research and Technology	(255.9)	(354.8)	314.8	321.7	321.7	317.2	317.2
Research & Technology Base	125.7	141.6					
In-Space Flight Experiments	11.2	16.0					
Civil Space Technology Initiative	119.0	114.3					
Space Automation and Telerobotics	(22.2)	82.9	(−40)				
Exploration Activities	(34.5)	(67.0)	61.0 (−6)	88.0	88.0	102.4	102.4
Exploration Technology	27.5	52.0					
Exploration Mission Studies	7.0	15.0					
Safety, Reliability and Quality Assurance	33.0	33.6	33.6	32.5	32.5	34.0	34.0
Academic Programs	55.1	64.6	64.6	70.5	70.5	74.5	74.5
Tracking and Data Advanced Systems	20.0	22.0	22.0	23.2	23.2	24.6	24.6
Space flight, control and data communications	5,124.4	5,608.3					

Shuttle Production and Operations Capability	1,276.4	1,288.9	1,358.9	1,277.0	1,277.0	1,210.5	1,210.5
Orbiter Operational Capability	275.6	273.8	(+30)	.....	.....	.....	.....
Propulsion Systems	747.8	622.7	(+50)	.....	.....	.....	.....
Launch and Mission Support	253.0	270.1	.....	.....	.....	.....	.....
Assured Shuttle Availability	0.0	122.3	(−10)	.....	.....	.....	.....
Space Shuttle Operations	2,790.0	3,023.6	2,970.6	3,059.8	2,968.8	3,161.2	2,897.2
			(−14; −39)		(−46; −45)		(−73; −191)
Flight Operations	801.5	912.5	.....	.....	.....	.....	.....
Flight Hardware	1,393.3	1,417.0	.....	.....	.....	.....	.....
Launch and Landing Operations	595.2	694.1	.....	.....	.....	.....	.....
Launch Services	229.2	341.9	315.9	281.0	289.0	315.8	359.8
Launch Services	229.2	341.9	(−36)	.....	(−22)	.....	(−6)
Commercial Launch Vehicle R&D	0.0	0.0	(+10)	.....	(+30)	.....	(+50)
Space and Ground Networks, Communications	828.8	953.9	920.0 (−33)	1,066.0	1,066.0	1,077.5	1,077.5
Space Network	310.1	348.0	.....	.....	.....	.....	.....
Ground Network	260.7	291.7	.....	.....	.....	.....	.....
Communications and Data Systems	258.0	314.2	.....	.....	.....	.....	.....
Construction of Facilities	497.9	480.3	430.3 (−50)	469.8	.....	541.6	.....
Research and program management	2,211.9	2,452.3	2,422.3 (−30)	2,492.6	.....	2,495.4	.....
Inspector general	10.5	14.6	14.6	15.3	15.3	15.7	15.7
Total	13,868.3	15,754.0	14,938.0	17,174.4	10,773.6	18,295.3	11,022.4

SUMMARY OF COMMITTEE VIEWS

POLICY

Science budget "Bow Wave".—The Committee is concerned that the future year budget requirements and projections resulting from the science programs requested in fiscal year 1992 are so large that no budget margin or new starts will be available.

SPACE STATION

Space Station program restructuring.—The Committee is concerned that the proposed restructuring of the Space Station will not achieve the original goals of the program.

Program managment.—The Committee is concerned that contemplated management changes may be disruptive and costly unless a clear long range transition plan is developed.

Engineering review of the Space Station restructuring.—The Committee directs NASA to request an independent engineering review of the Space Station restructuring plan.

SPACE TRANSPORTATION CAPABILITY DEVELOPMENT

Single stage to orbit.—The Committee directs NASA to study the potential technology applications of the Single Stage to Orbit program to civilian space activities and report to the Congress within 90 days of enactment of the bill.

PHYSICS AND ASTRONOMY

Deletion of Space Station attached payloads.—The Committee regrets NASA's deletion of the attached science payloads from the Space Station program and directs NASA to develop alternative means of conducting the experiments that were deleted.

Astronomy and astrophysics in the 1990's.—The Committee urges NASA to give serious consideration to the findings and recommendations of the National Academy of Sciences' review of astronomy and astrophysics priorities for the 1990's when the Office of Space Sciences and Applications revises its strategic plan. The Committee also urges that the Small Explorer program be responsive to the needs of the investigators.

LIFE SCIENCES

Lifesat.—The Committee reduces NASA's runout for the Lifesat program and urges NASA to exert strong discipline over program costs.

Cooperative research on Mir.—The Committee supports cooperative life sciences research on the Soviet space station Mir and directs NASA to request a study by the National Academy of Sciences on such cooperative activities.

PLANETARY EXPLORATION

Comet Rendezvous Asteroid Flyby (CRAF) program.—The Committee is concerned about the turbulence in the CRAF program over the past year.

Planetary exploration and the proposed Office of Exploration.—The Committee has reservations about the potential transfer of robotic missions from the OSSA to the new office of Exploration and urges the NASA Administrator to formally solicit the views of the scientific community prior to approving such a transfer.

EARTH SCIENCE AND APPLICATIONS

Earth Observing System.—In the absence of the report of the Earth Observing System (EOS) external engineering review and an affordable plan for this program, the Committee has reduced the rate of increase in funding for EOS.

EOS Data and Information System.—The Committee directs NASA to maintain the schedule for the EOSDIS procurement and continue rapid development of EOSDIS Version 0.

Landsat data purchase.—The Committee has made $5,000,000 available only for the purchase of Landsat data for the Global Change Research Program, with the intention that NASA and the private operator of Landsat reach a mutual agreement on an equitable and low-cost price for Landsat Thematic Mapper data. The Committee urges NASA to assist in preserving archived Landsat data and to incorporate new and archived data into the EOS Data and Information System.

Procurement of long-lead parts for a follow-on to Landsat 6.—The Committee has added funding for the purchase of long-lead time parts for a follow-on to Landsat 6 in order to reduce the likelihood of a gap in data continuity.

Earth probes.—The Committee has augmented the funding for Earth Probes to accelerate the development of the Tropical Rainfall Measurement Mission and to fly the Earth science attached payloads deleted from the space station.

MATERIALS PROCESSING IN SPACE

Reduction in funding for Space Station utilization.—The Committee believes that NASA should provide alternative flight opportunities for the physics and astronomy attached payloads that were deleted from the Space Station program.

COMMUNICATIONS

ACTS experiments program.—The Committee believes that NASA should maintain adequate funding for an industry experiments program using ACTS notwithstanding contemplated establishment of Centers for the Commercial Development of Space.

INFORMATION SYSTEMS

Preserving existing data and handling new data.—The Committee urges NASA to devote sufficient resources to preserving data collected over the past 30 years.

TECHNOLOGY UTILIZATION

Reduction in rate of funding increase.—The Committee believes that the technology utilization program can be made more effective within a more modest budget envelope.

COMMERCIAL USE OF SPACE

Budgetary growth associated with flight programs.—The Committee reaffirms its support for programs to encourage private investment in space activities but believes that budget realities prevent the near doubling of the budget for Commercial Use of Space.

Industry participation.—The Committee requests a report on plans to increase incentives for the Centers for the Commercial Development of Space (CCDS) to obtain industry cash support, such as a matching fund program, and plans for the periodic recompetition of CCDS contracts.

SPACE RESEARCH AND TECHNOLOGY

Flight Telerobotic Servicer.—The Committee reduces the funding for the Flight Telerobotic Servicer program in the wake of the transfer of this program out of the Space Station Office.

High capacity power.—The Committee encourages NASA to continue to emphasize the development of High Capacity Power technologies.

EXPLORATION ACTIVITIES

SP-100 reactor program.—The Committee wishes to be kept informed as to how the exploration-related requirements of the SP-100 program are being addressed.

Synthesis Group.—The Committee notes that the Synthesis Group will be reporting on alternative approaches to human exploration. The Committee requests a report on NASA's response to the Synthesis Group's findings and directs NASA to have a core group of advisors from the Synthesis Group assist in the assessment of the recommendations of the Synthesis Group.

ACADEMIC PROGRAMS

Educational goals of the human exploration program.—The Committee commends the establishment of education as a primary goal of Human Exploration. The Committee believes that a focused program of secondary educational initiatives and direct university and academic programs will be necessary to provide the educated workforce necessary to carry out an aggressive Human Exploration program.

SPACE SHUTTLE PRODUCTION AND OPERATIONAL CAPABILITY

Orbiter production readiness.—The Committee directs NASA to move with all deliberate speed to complete a long-range plan for the Space Shuttle Orbiter production line.

SPACE SHUTTLE OPERATIONS

Cost savings in the Space Shuttle program.—The Committee notes the testimony of key NASA officials that significant cost savings could be achieved in the Space Shuttle program without causing a negative impact on quality or safety. The Committee expresses support for such an initiative.

LAUNCH SERVICES

Deletion of funding for the MSAT launch vehicle.—Given the recent court decision effectively rescinding the license for the American Mobile Satellite Consortium (AMSC), the Committee believes that funding to pay for part of the launch vehicle for AMSC's mobile communications satellite (MSAT) would be premature and that federal agencies should procure MSAT services directly as required.

Research and development support for the commercial launch vehicle industry.—The Committee continues to urge NASA to take actions to develop and provide new technologies to the commercial launch vehicle industry.

SPACE AND GROUND NETWORKS, COMMUNICATIONS, AND DATA SYSTEMS

Adequacy of funding.—The Committee expresses its concern that delaying planned improvements of aging and inefficient equipment may result in greater long-term costs and degradation in NASA's ability to support future flight missions.

Advanced tracking and data relay satellite.—The Committee views the Advanced TDRS procurement as an opportunity to establish a more cost-effective space network and urges NASA to consider procurement on a fixed-price basis as one potential option.

COMMERCIAL SPACE LAUNCH ACT AMENDMENT

Improvements to space transportation infrastructure.—The Committee authorizes funding in the Department of Transportation to improve the Nation's launch sites and launch site facilities.

LEGISLATIVE REPORTING REQUIREMENTS

REFERENCE AND REQUIREMENT

Section 4(a)(1)(A).—A report on the long range management plan for the Space Station program including the evolution of the systems engineering and integration and operations responsibilities. Due by December 31, 1991.

Section 4(a)(1)(A).—A report on an independent engineering review of the Space Station restructuring by the Aeronautics and Space Engineering Board of the National Research Council. Due by January 31, 1992.

Section 4(a)(1)(B).—A report on NASA's review of the potential applications of Single Stage to Orbit technologies to civilian space activities. Due 90 days after enactment of this legislation.

Section 4(a)(1)(D).—A National Academy of Sciences study on the utilization of the Soviet space station Mir to support near-term United States life science research activity. Due within one year after the commencement of the study, which is to be initiated within sixty days of the enactment of this Act.

Section 4(a)(1)(K).—A report on NASA's plans for increasing incentives for Centers for the Commercial Development of Space (CCDS) to obtain industry cash support, NASA's process for reviewing the level of industry support obtained by the centers, and NASA's plans of recompeting the CCDS contracts. Due on November 1, 1991.

Section 4(a)(1)(O).—A report on NASA's response to the Findings and Recommendations of the Synthesis Group. Due six months after the release of the Synthesis Group's report.

Section 4(a)(2)(B).—A report on how NASA will achieve annual cost savings of 3 to 5 percent in the Space Shuttle programs. The report is due by March 1, 1992.

Section 4(a)(2)(C).—A report summarizing the progress NASA is making in providing technology support to the commercial launch vehicle industry. The report is due by March 1, 1992.

Explanation of the Bill and Committee Views

SECTION 1: SHORT TITLE

Section 1 designates that the act may be cited as the "National Aeronautics and Space Administration Multiyear Authorization Act of 1991."

SECTION 2: FINDINGS

Section 2(1) finds that the report of the Advisory Committee on the Future of the U.S. Space Program, known as the "Augustine report", has provided a framework for developing a consensus on space goals.

Section 2(2) finds that a balanced science program should be funded at 20 percent of the non-institutional budget of NASA. This is intended to maintain an overall balance between science and infrastructure development.

Section 2(3) finds that cooperation with the Soviets on the Space Station Mir may enhance the life sciences data base. This finding is based on the foreign policy benefits that may accrue and the overall cost effectiveness of utilizing existing space capabilities, especially in view of the diminishing scope of life sciences intended for the near term on the Space Station Freedom. This finding is not intended to signify any lessening of support for a strong U.S. program of permanent manned presence in space.

Section 2(4) finds that the space program can make substantial contributions to medical and health related research. The intent is to encourage an integrated plan of health research between NASA and other health related research agencies.

Section 2(5) finds that Landsat data are essential to any long term environmental research program such as Mission to Planet Earth. The Committee intends that NASA undertake efforts to integrate Landsat data into the EOS Data and Information System for use by participating researchers.

Section 2(6) finds that heretofore classified remote sensing data may be of use for environmental research programs such as Mission to Planet Earth and Global Change. The Committee intends that NASA undertake a program, in cooperation with Defense and Intelligence agencies, to study ways of utilizing such data without compromising national security.

Section 2(7) finds that the Space Exploration Initiative will depend directly on the generation of trained scientists and engineers. The Committee believes that the successful generation of the necessary trained work force can be accomplished through a bal-

ance of societal educational initiatives at the secondary educational level, and also through directly administering related grants and contracts to colleges and universities to employ faculty and students in space exploration research.

Section 2(8) finds that policies which restrict the use of foreign launch vehicles for U.S. government satellites should only apply when adequate U.S. launch capabilities are available. The Committee recognizes that such restrictive policies are intended to provide support for a strong U.S. launch services industry. Indeed, the Committee has provided NASA ample authority in the past to restrict procurement of launch services to domestic sources. However for some satellites, such as the Earth Observing System platform A, the absence of a U.S. launch system with lift capabilities between the Atlas E and Titan IV-class vehicles from the West Coast has resulted in a program which may be overly complex and costly. The Committee strongly feels that adequate launch capabilities out of the West Coast should be established. However, if such is not possible, the intent of this finding is to encourage the seeking of waivers from any such restrictive policies if the application of such policies does not serve the public interest or result in a cost-effective scientific program.

Section 2(9) finds that strengthening the Nation's space transportation infrastructure is essential to the Nation's space activities.

Section 2(10) finds that NASA's aeronautical program contributes to the Nation's technological competitive advantage, and that the program has been a key factor in the U.S. in maintaining preeminence in aviation over the past decades.

Section 2(11) finds that the new and innovative technologies developed for the National Aero-Space Plane may benefit military and civilian aviation programs, particularly those involving high-speed aeronautical and space flight.

SECTION 3: POLICY

Section 3(1) states the policy that the Administrator should ensure resiliency in the space infrastructure. The Committee intends that this policy result in multiple capabilities for access to space, especially in assembling and servicing the Space Station.

Section 3(2) states the policy that a balanced and stable science program should be planned to minimize future year funding requirements.

Committee view

Science Budget "Bow wave"

The Committee clearly recognizes the great progress that has been made in developing an overall strategic plan for carrying out a balanced space science program. This plan has provided valuable long range planning data on the decisions that can be anticipated in initiating future missions and projects. The report of the Advisory Committee on the Future of the U.S. Space program has recommended the execution of this strategic plan and, further, established a budgetary context for this plan as a 20 percent share of the overall NASA budget (normally taken to be the non-institution-

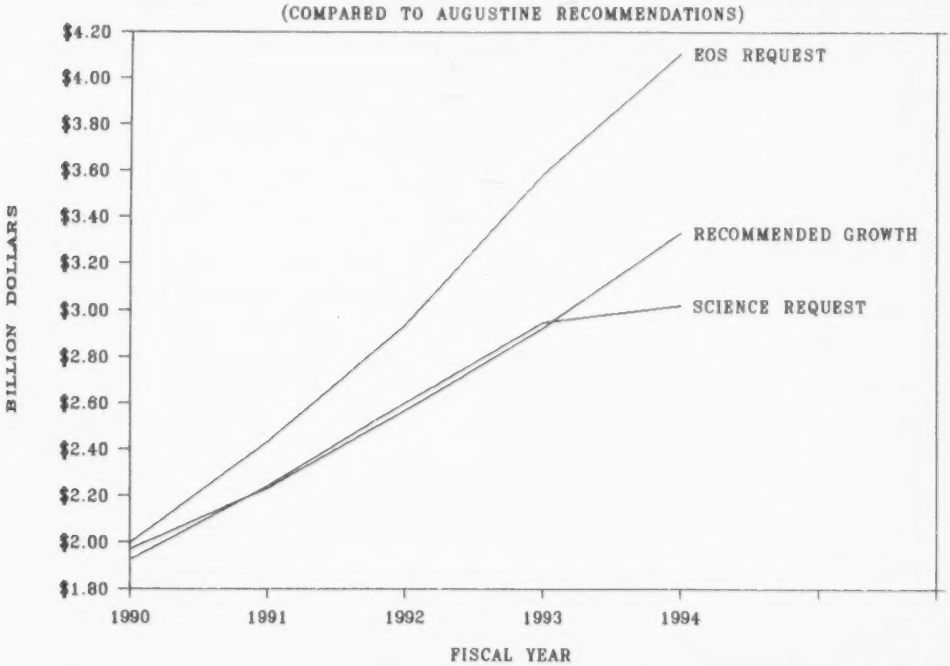
al budget, Research and Development, and Space Flight, Control, and Data Communications).

The Committee endorses these recommendations as a reasonable way of structuring a balanced science program that provides a steady stream of new starts. However, the Committee notes that the fiscal year 1992 request for NASA's overall science program represents an increase over FY 1991 of nearly 21 percent of which less than one percent is attributable to new starts. Furthermore, the funding required in fiscal year 1993 to carry out the programs approved in fiscal year 1992 represents an increase of 22 percent. Thus, the issue arises whether such increases can be expected in the present budgetary environment and, if not, can such a strategic plan be considered sound.

Figure 2 shows a general representation of the budgetary context implied by the Augustine report. Shown is a 20 percent allocation of the overall NASA budget for the past two fiscal years together with the next three fiscal years if the overall NASA budget grows in real terms by 10 percent per year. This can be compared to the budget actually provided in the past and requested in the future for NASA's science program exclusive of the Earth Observing System (EOS) (which is generally considered to be a "special initiative" and not included in a balanced science program). The additional funding for the Earth Observing System is also shown.

FIGURE 2. SCIENCE BUDGET PROJECTIONS

(COMPARED TO AUGUSTINE RECOMMENDATIONS)



As shown, of the budget continues to grow at the opimistic rate recommended by the Augustine report, NASA's fiscal year 1993 budget for the balanced science program contains virtually no margin and no planned possibility for a new start. Not until fiscal year 1994 does any margin materialize. The Committee is con-

cerned that any failure of the NASA budget to grow at the optimistic rate will result in program stretch outs (with their attendant cost overruns), program cancellations, a malaise in new activity, and a general disruption in the science community. Science opportunities that have been promised cannot be provided.

In addition, the funding required for the special initiative, EOS, must be provided from elsewhere in the budget. NASA's multiyear budget request shows that funding for Research and Program Management and Space Flight is expected to stablize and conceivably provide this funding wedge. Indeed, the Augustine report recommends substantial initiatives to reduce personnel overhead, Center overlap, and greater efficiencies in the Shuttle program. The Committee notes, however, that stabilizing these programs will be a challenging management task and genuine cost savings must be realized if such special initiatives as EOS are to be carried out above and beyond the balanced science program.

The Committee recommends that NASA reevalaute its strategic science plan to establish a more realistic budgetary context. Announcements of opportunity must be carefully managed and offered only if genuine and realistic opportunities exist. Finally, NASA should plan such special initiatives as EOS only if legitimate funding wedges can be developed from efficiencies elsewhere in the NASA budget.

Section 3(3) states that any major new launch system should be based on actual program requirements or policies established by Congress. The Committee's hearings have not identified any specific programmatic need for the proposed New Launch System at this time except for assembly of the Space Station. Although the Committee concurs with and endorses the recommendations of the Augustine report related to the need for a new launch system, the Committee seeks to integrate this recommendation into NASA's overall program plan.

Section 3(4) states that in fulfilling the mission of NASA as articulated in the original Space Act, the Administrator should undertake a program of research and development to enhance the competitiveness and cost effectiveness of the commerical industry. The Committee has provided funding for a component technology program for this purpose.

Section 3(5) states that a major activity of NASA should be to conduct research on pressing environmental problems such as global warming, ozone depletion, acid rain, deforestation, and smog.

SECTION 4: AUTHORIZATION OF APPROPRIATIONS

Section 4(a)(1)(A) Space Station Freedom

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$2,028,900,000
1993	2,426,000,000
1994	2,790,800,000
Committee Recommendation:	
Fiscal year:	
1992	2,028,900,000

Committee authorization recommendation

Section 4(a)(1)(A) authorizes $1,900,000,000 for fiscal year 1992, of which $25,000,000 is to be used for the development of an Assured Crew Return Vehicle. An additional $128,900,000 is authorized upon the submission of a report to the Committee of an independent engineering review of the Space Station restructuring by the Aeronautics and Space Engineering Board of the National Research Council.

Program description

The Space Station program is directed toward the development of a permanently manned, 30-year research facility in low-Earth orbit. It is an International Space Station, being developed jointly by the United States, Canada, the European Space Agency, and Japan. The multi-Center program is managed by means of a Level II Space Station Program Office located in Reston, Virginia.

The Space Station program is in the process of being restructured to confrom to Congressionally directed budgetary guidelines. In addition, the Space Station program management structure is being reviewed by senior NASA management.

Committee views

Space Station Program restructuring

The Committee has been a strong and consistent supporter of the Space Station program. The Committee notes with some disappointment that over the last seceral years many of the original capabilities that NASA indicated would be provided for the Space Station have been deleted or deferred into the indefinite future as a result of budgetary, cost, and technical difficulties. However, the Committee believes that the original program objective of providing a robust permanent outpost in space and a utilitarian laboratory for scientific activities should remain the preeminent goal.

The Advisory Committee on the Future of the U.S. Space Program and a number of other advisory groups have stated that the primary need for the Space Station is to do life sciences experimentation and to support the development and verification of long duration space operting systems for human space flight. A permanently manned, rather than a man-tended Space Station is required to carry out those activities. The Committee is concerned, however, that the current restructuring of the Space Station program seriously weakens the commitment to achieving a permanently manned capability.

The tentative date for achieving a permanently manned capability (PMC) has been slipped three years into the future relative to the schedule in place just 18 months ago. In addition, the levels of budgetary reserves contained in the restructured program, the aparent lack of a specific funding plan for an Assured Crew Return Vehicle (ACRV), and a countinuing uncertainty over the likely costs that will be associated with the operation of the Space Station mean that there may not be sufficient resources allocated in the program to ahcieve PMC.

The low level of reserves to cover problems during the crucial development period FY 1991-95 means there is an uncomfortably

high likelihood of further schedule slippage during that time. Such schedule slips would have a significant cost impact, given that the program will be expending funds at the rte of $200 million per month during that period.

The ACRV is critical to the achievement of a permanently manned capability, and the Committee supports its development. However, the ACRV is estimated to cost $1-2 billion to develop, and NASA had not incorporated it into the Space Station budgetary plan during the restructuring.

The Committee reiterates its long-standing concern over the potential operations costs of the Space Station. The NASA Authorization Act for FY 1988 requires that the annual budget submission after FY 1997 for the basic operation and enhancement of the Station and its associated ground systems not exceed 10 percent of the total NASA budget. Control of operations costs must be in high priority of the Space Station program. Holding operations costs down may require changes in NASA's traditional approaches to operations. Indeed, in the Committee Report accompanying the FY 1987 NASA Authorization Act, the Committee urged NASA

> to consider innovative approaches to operations cost control including institutional measures which will decrease the number of ground personnel required to operate the Station, minimize the sustaining engineering manpower, and reduce the administrative overhead, all while maintaining an adequate margin of safety.

Since the Space Station is envisioned to be a national (and international) research facility, NASA may wish to consider how other national research facilities are operated, such as the DOE laboratories, which are operated by private contractors. The Committee offers no specific recommendations to NASA at this time, but does emphasize that it will be paying close attention to NASA's approach to operations over the coming year.

The Committee continues to be concerned that the restructured Space Station design has not reduced transportation requirements for the assembly and outfitting of the Station. The number of Shuttle flights required to assemble and outfit the restructured Station to the point of PMC is approximately equal to the number required to assemble and outfit the previously baselined complete Phase 1 Station, even though the restructuring eliminated a set of solar arrays, two nodes, and other content that had been in the Phase 1 program.

The Committee again notes that many of the previously planned uses of the Space Station have been eliminated or deferred in recent years, and the Committee thus is troubled by the impact of the restructuring on the Space Station's remaining capabilities to support scientific research. The Committee urges NASA to address constructively the issues raised in the reports of the National Research Council and the NASA Advisory Council on the utilization of the Space Station for scientific experimentation.

The Committee notes with approval that the adoption of a pre-integrated truss should reduce assembly EVA and simplify the assembly task. In addition, the adoption of down-sized modules should, if they are designed and managed properly, allow greater

ground-based outfitting and checkout of the modules prior to launch. The Committee commends the NAS and contractor personnel involved in the restructuring for their hard work and dedication to the task.

Program management

Many internal and external advisory groups strongly recommended the establishment and support of an independent Space Station Level II program office. In fact, this Committee, in its 1986 report on its investigation of the Challenger accident, recommended that NASA shold give special attention to moving the Shuttle program manager to NASA Headquarters

> to avoid the confusion and inter-center rivalry that resulted from having a large multi-center program managed out of one of the participating centers.

All of these recommenations led to the establishment of the current Level II Space Station office. Furthermore, the National Research Council's 1987 report to the White House on the Space Station program recommended that

> NASA management must emphasize that the Space Station Program Director [i.e., the head of the Level II office] is the principal line manager of the Space Station Program and is accountable for the successful development of the Space Station. He must be equipped with authority commensurate with this accountability.

and

> The Space Station Program Office [i.e., Level II] must be continually supported and reinforced by senior NASA management. There are likely to be tendencies for control of the Space Station Program to move away from the Program Office to the NASA Centers. Such diffusion of influence would be highly inappropriate for the Space Station Program.

On the other hand, the Augustine Committee report clearly recommended a revision of this approach and the focusing of program management closer to the participating NASA Centers. In addition, many have argued that the existence of an independent Washington based program office is duplicative and costly. The Committee is aware of the substantial difficulties NASA has had in attracting highly qualified personnel for the level II office.

Furthermore, the Committee fully recognizes that different management structures may be required for each major phase of the Station program. This need must, however, be balanced against the potential costs and loss of control that may accompany disruptive management changes. The need to avoid disruptions would appear to be particularly important over at least the next year, given that, as a result of the restructuring, "delta PDRs" and a Man-Tended Phase Review will have to be conducted, Work Package responsibilities will have to be conducted, Work Package responsibilities will have to be adjusted, program documentation will have to be re-

vised, and so forth. Indeed, this type of activity may well persist until the Critical Design Review.

Since previous management plans submitted to the Congress have not discussed a change in the management structure like that which appears to be contemplated, the Committee requests that NASA develop a comprehensive long range management plan for the Station including the evolution of systems engineering and integration and operations responsibilities. This plan should recommend clear program responsibilities for the remaining phases of the Station program. In addition, the report must identify the cost and schedule impacts of proposed changes to the current management approach. The Committee requests that this plan be submitted accompanying any proposed management change but not later than December 31, 1991.

Engineering review of the Space Station restructuring

The Committee believes that the Space Shuttle restructuring will have a significant impact on the future course of the program. The restructuring was completed on an extremely tight schedule, and many aspects of the restructured program are not yet fully understood. The Committee directs NASA to request that the Aeronautics and Space Engineering Board of the National Research Council conduct the review. The review should be submited to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Technology of the Senate by January 31, 1992. The review should address at least the following: (1) an evaluation of the overall development and operating costs of the restructured Station, as well as an examination of the adequacy of the reserves provided and identification of any unfunded requirements; (2) a review of the potential to evolve the Station beyond the man-tended configuration and beyond the permanently named capability; (3) an assessment of the potential and options for performing life sciences on the Station prior to the year 2000; (4) an assessment of the transportation options for the Station assembly and resupply including the role of a heavy lift launch vehicle; (5) an assessment of the logistics and maintenance requirements for the restructured Station; (6) an assessment of the ability of the restructured designed to support utilization activities.

Section 4(a)(1)(B) Space Transportation Capability Development

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$879,800,000
1993	999,800,000
1994	997,400,000
Committee recommendation:	
Fiscal year:	
1992	679,800,000
1993	799,800,000
1994	847,400,000

Committee authorization recommendation

Section 4(a)(1)(B) authorizes the appropriation of $679,800,000 in fiscal year 1992 for Space Tansportation Capability Development

activities. This represents a decrease of $200,000,000 below the President's request. This decrease reflects the combined effect of: a $20,000,000 decrease in funding for Upper Stages, deferring some funding for the purchase of a Centaur upper stage pending completion of negotiations with the Defense Department; a $10,000,000 decrease in funding for Spacelab activities, deferring some hardware replacement; a $15,000,000 decrease in the Engineering and Technical Base, reflecting a slower than planned rate of growth; decrease of $15,000,000 in Payload Operations and Support Equipment, deferring some Space Station support; a $15,000,000 decrease in Advanced Program, deferring increased emphasis on a personnel transportation system; and a $125,000,000 decrease in funding for the New Launch System, leaving $30,000,000 for propulsion technology development and $20,000,000 for the development of other launch technologies, including single stage to orbit vehicles.

Section 4(a)(1)(B) also authorizes the appropriation of $799,800,000 in fiscal year 1993 and $847,400,000 in fiscal year 1994 for Space Transportation Capability Development activities. The authorization for fiscal year 1993 is based on an Administration estimate of $999,800,000 and a reduction of $200,000,000. The Committee intends this reduction to be taken in funding for the New Launch System, leaving a total of $75,000,000 to fund that program in fiscal year 1993.

The authorization for fiscal year 1994 is based on an Administration estimate of $997,400,000 and a reduction of $150,000,000. The Committee intends this reduction to be taken in funding for the New Launch System, leaving a total of $125,000,000 to fund that program in fiscal year 1994.

Program description

The principal areas of activity in Space Transportation Capability Development include the operation of Spacelab flight hardware with some continuing development activities; procurement of Upper Stages required to place satellites in high altitude orbits; the Engineering and Technical Base support at the manned space flight centers; Payload Operations and Support Equipment for accommodating NASA payloads that will fly on the Space Shuttle; Advanced Programs study and evaluation efforts; Advanced Transportation Technology efforts including the Administration's request for the definition and preliminary development of a new launch vehicle capability and improved propulsion technology; and the design and development of the United States/Italian Tethered Satellite System.

Committee view

Single Stage to Orbit

The Committee has long been interested in assured access to space, and is enthused about the recent declassification of developments in the single stage to orbit (SSTO) program with the Strategic Defense Initiative Office. The Committee supports the federal government's consistent support of basic research, but is concerned about the smaller level of effort which goes into the practical application of this research. The technologies developed in the SSTO program after a great potential for civilian and commercial appli-

cations. NASA stands to benefit from the spin-offs in areas such as propulsion, materials, structures, and operations. The Committee directs NASA to study the potential technology applications of the SSTO program to civilian programs, and requsts a report to Congress on these applications within 90 days of enactment of this legislation. Within the component technology program the Committee directs NASA to address the broadest possible range of technologies that have the potential for commercial spin-off into the civil marketplace.

Section 4(a)(1)(C) Physics and Astronomy

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$1,140,600,000
1993	1,321,400,000
1994	1,308,500,000
Committee recommendation:	
Fiscal year:	
1992	1,096,600,000
1993	1,321,400,000
1994	1,308,500,000

Committee authorization recommendation

Section 4(a)(1)(C) authorizes $1,096,600,000 in fiscal year 1992, $1,321,400,000 in fiscal year 1993, and $1,308,500,000 in fiscal year 1994 for Physics and Astronomy. Of this amount, $6,000,000 has been transferred from the Materials Processing in Space budget line to allow alternate development of experiments that were to be Space Station attached payloads. Of the reductions from the President's request, $38,000,000 shall be taken from the Advanced X-Ray Astrophysics Facility account and a total of $12,000,000 shall be taken from the Orbiting Solar Laboratory and Space Infrared Telescope Facility mission studies accounts.

Program description

The objectives of the Physics and Astronomy program are to increase understanding of the origin and evolution of the universe, the fundamental laws of physics, and the formation of stars and planets. The objectives of the Physics and Astronomy program are accomplished by means of a mixture of large free-flying space missions, Explorer spacecraft, Shuttle/Spacelab flights, and suborbital missions.

The Physics and Astronomy program will continue development of the third of the Great Observatories, the Advanced X-Ray Astrophysics Facility (AXAF) in fiscal year 1992.

Work will also continue on the Global Geospace Science (GGS) mission. This mission supports an international cooperative activity, the Collaborative Solar Terrestrial Research (COSTR) project. Teams from the United States, the European Space Agency, and Japan are involved in COSTR.

The Explorer program will continue development activities on the X-ray Timing Explorer (XTE) in FY 1992. In addition, two new Explorers, the Advanced Composition Explorer (ACE) and the Far

Ultraviolet Spectroscopic Explorer (FUSE), will begin development in fiscal year 1992.

Committee views

Deletion of Space Station attached payloads

The Committee regrets that the attached physics and astronomy payloads have been deleted from the Space Station program as a part of the restructuring. The experiments that were to have been carried out by means of the attached payloads have been a part of the Office of Space Science and Applications Strategic Plan for a number of years. Indeed, investigator teams, including a number from universities, had already been formed to implement those peer-reviewed proposals that had been approved by NASA. If the Strategic Plan's approach to setting priorities in the space science program is to have meaning, then provision should be made to provide alternative access to space for those experiments that have been part of the Strategic Plan but which have lost their originally planned payload carrier. Thus, the Committee is transferring $6,000,000 from the Space Station utilization account of the Materials Processing in Space budget line to fund development of alternative means of conducting experiments that were to fly as attached payloads on the Space Station.

Astronomy and astrophysics in the 1990's

The Committee notes with interest that the National Academy of Sciences (NAS) has completed a review of potential space-based and ground-based astronomical and astrophysical projects that could be undertaken in the 1990's. The NAS committee achieved a consensus on a number of recommendations to strengthen the field, both through a judicious selection of missions and through improvements to infrastructure. The Committee urges NASA to give serious consideration to the findings and recommendations of the NAS study when the Office of Space Science and Applications revises its Strategic Plan.

An important feature of the astronomy and astrophysics program of the 1990's is the provision of small payload opportunities, which NASA plans to provide through the Small Explorer (SMEX) program. The SMEX program is intended to offer low cost, flexible, and rapid access to space for small and innovative payloads. The Committee thus reacts with some concern to reports from the science community that the SMEX program as currently structured may not achieve those goals. Specifically, it is important that the paperwork and procedures associated with the SMEX program be streamlined to the maximum extent possible. In addition, flexibility should be available to experimenters in the design of missions, and rigid standardization should not be forced on disparate missions. The Committee urges NASA to work with the science community to ensure that the SMEX program is responsive to the needs of the investigators.

Section 4(a)(1)(D) Life Sciences

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$183,900,000
1993	284,000,000
1994	326,100,000
Committee recommendation:	
Fiscal year:	
1992	183,900,000
1993	224,000,000
1994	246,100,000

Committee authorization recommendation

Section 4(a)(1)(D) authorizes $183,900,000 in fiscal year 1992, $224,000,000 in fiscal year 1993, and $246,100,000 in fiscal year 1994 for Life Sciences. Of the amount authorized in fiscal year 1992, $2,000,000 is provided for cooperative life sciences research activities on the Soviet space station Mir. The reductions from the President's estimates for fiscal year 1993 and fiscal year 1994 shall be taken from the Lifesat account. The intent of the reductions is to slow the rate of increase in Lifesat funding.

Program description

The Life Sciences program is directed toward increased understanding of human responses and adaptability to the space environment. Such knowledge is essential to the success of the ambitious human activities contemplated under the Space Exploration Initiative. It also has the potential to contribute to our understanding of terrestrial diseases and medical problems. The Life Sciences program will also provide information important to the success of Space Shuttle and Space Station operations.

Several Shuttle Spacelab missions with significant levels of life science experimentation are planned for fiscal year 1992. Definition and development of an integrated Centrifuge facility for use on Space Station will continue in fiscal year 1992. Lifesat, a reusable reentry satellite for life sciences research, will be a new program initiative in fiscal year 1992. Its mission initially will focus on radiation research.

Committee views

LIFESAT

The Committee has strongly supported the need for the capabilities afforded by Lifesat. In addition to fulfilling the focussed research needs in space radiation, the Committee intends that the Lifesat program will provide to the life sciences community a means for frequent, low cost flight opportunities. NASA will have to exercise strong program discipline to ensure that Lifesat's development and recurring costs are kept under control. The Committee stated in H.R. 5649, the National Aeronautics and Space Administration Multiyear Authorization Act of 1990, H. Rept. 101-763, that it intended to review NASA's performance in meeting this goal. The significant increase in Lifesat program cost estimates over the last year concerns the Committee. Therefore, the Committee is re-

ducing its authorization for the Lifesat program in fiscal year 1993 and fiscal year 1994 below NASA's planned runout. The Committee reiterates that continued Lifeset program cost growth will not be supported, since uncontrolled cost growth in any one life sciences flight project can jeopardize the conduct of a balanced Life Sciences program.

COOPERATIVE RESEARCH ON MIR

NASA has cooperated with the Soviet life sciences research community for a number of years. The Committee supports the continuation of appropriate cooperative activities in the life sciences. To that end, the Committee is providing $2,000,000 of the fiscal year 1992 Life Sciences authorization for cooperative life sciences research activities on the Soviet space station Mir. The intent of the funding is not to support policy studies but rather to support cooperative utilization activities. As part of this activity, NASA is directed to initiate, within sixty days of enactment of this Act, a National Academy of Sciences study on the utilization of the Soviet space station Mir to support near-term United States life sciences research activity.

This study shall be completed and reported to Congress within one year after commencement of said study.

Section 4(a)(1)(E) Planetary Exploration

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$627,300,000
1993	635,300,000
1994	643,500,000
Committee recommendation:	
Fiscal year:	
1992	299,300,000
1993	251,900,000
1994	263,400,000

Committee authorization recommendation

Section 4 (a)(1)(E) authorizes $ 299,300,000 in fiscal year 1992, $251,900,000 in fiscal year 1993, and $263,400,000 in fiscal year 1994 for Planetary Exploration. The amounts authorized in Section 4(a)(1)(E) exclude funding for the Comet Rendezvous Asteroid Flyby/Cassini (CRAF/Cassini) mission. A multiyear authorization for the CRAF/Cassini mission, not to exceed $1,600,000,000, was provided in Public Law 101-611 (Nov. 16, 1990).

Program description

The Planetary Exploration program focuses on the scientific exploration of the solar system, including the planets, their satellites, comets, asteroids, and the interplanetary medium.

In fiscal year 1992, the Mars Observer spacecraft will be launched on an expendable launch vehicle to Mars, where it will go into orbit about the planet. Its mission objectives are to map the global surface composition, atmospheric structure and circulation, topography, gravity, and magnetic fields of Mars.

Development activities will continue on the CRAF/Cassini mission. The CRAF/Cassini program was restructured in early 1991. CRAF's mission is to pass by an asteroid and rendezvous with a comet, making long-term measurements. Cassini is intended to undertake long-term observations of Saturn's atmosphere, rings, magnetic field, and moons. As part of the mission, a probe will be launched into the atmosphere of the moon Titan.

Committee views

Comet Rendezvous Asteriod Flyby (CRAF) program

The Committee is troubled by the turbulence in the CRAF program over the past year. The Committee recognizes that the withdrawal of planned foreign participation from part of the spacecraft development effort had an adverse impact on the program plan. Nonetheless, it appears to the Committee that there was an underestimation of the technical risk associated with the program, especially with respect to the Penetrator, which has led to significant upward cost pressures. The subsequent elimination of the Penetrator has led to a marked decrease in the science content of the mission relative to the orginal plans. That such a dramatic descoping had to occur so soon after the completion of the Phase B activities that should have bounded the technical and cost risks of the program prior to the initiation of Phase C/D is disturbing. The Committee will be watching the progress of this program very carefully over the coming year.

PLANETARY EXPLORATION AND THE PROPOSED OFFICE OF EXPLORATION

The advisory Committee on the Future of the U.S. Space Program suggested that NASA consider establishing an Associate Administrator for Exploration "with responsibility for both robotic and manned exploration of the Moon and Mars." The NASA Administrator has indicated that he will establish a new Office of Exploration. To date, no decision has been announced regarding the potential transfer of robotic mission responsibility from the Office of Space Sciences and Applications (OSSA) to the new Office of Exploration.

The Committee has reservations about the wisdom of such a transfer. Robotic exploration of the Moon and Mars has long been an integral part of a balanced planetary science program and would likely remain so even in the absence of a human exploration program. There do not appear to be compelling reasons to eliminate OSSA's responsibility for such robotic missions, although there clearly should be close coordination with the Office of Exploration. The Committee would therefore encourage the NASA Administrator to formally solicit the views of the scientific community through the appropriate solar system exploration committees of the NASA Advisory Council and the National Academy of Sciences prior to any decision on where to assign the responsibility for lunar and Mars robotic missions.

Section 4(a)(1)(F) Earth Science and Applications

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$775,600,000
1993	1,108,000,000
1994	1,562,500,000
Committee recommendation:	
Fiscal year:	
1992	725,600,000
1993	830,000,000
1994	950,500,000

Committee authorization recommendation

Section 4(a)(1)(F) authorizes the appropriation of $725,600,000 in fiscal year 1992 for Earth Science and Applications. This represents a reduction of $50,000,000 from the President's request, reflecting the combined effect of: a reduction of $75,000,000 in the Earth Observing System, including the EOS Data and Information System; the addition of $10,000,000 for Earth Probes; the addition of $4,000,000 for Mission Operations and Data Analysis to continue those data analysis activities deferred in fiscal year 1991 by the reprogramming of $4,000,000 for the Ocean Color Mission data purchase; the addition of $1,000,000 for converting data collected by classified remote sensing systems to civilian uses; the addition of $5,000,000 for the procurement of long-long parts for the follow-on to Landsat 6; and the addition of $5,000,000 only for the purchase of Landsat data for global change research. The Committee intends that NASA and the private operator of Landsat reach a mutual agreement on an equitable and low-cost price for Landsat Thematic Mapper data. Section 4(a)(1)(F) also authorizes the appropriation of $830,000,000 in fiscal year 1993 and $950,500,000 in fiscal year 1994, which represents ten percent real growth in the Earth Science and Applications budget.

Program description

The Earth Sciences program consists of the Earth Observing System (EOS) the Earth Probes, precursor missions, and Earth science. These programs constitute NASA's Mission to Planet Earth, which is the space-based data collection and analysis activity of the U.S. Global Change Research Program. NASA's programs are part of a larger international effort related to gaining a better understanding of the Earth's environment and global change phenomena.

The Earth Observing System will be a long-term effort to obtain a fifteen-year data set on atmospheric, oceanic, and geological processes and interactions, with the objective of examining critical global change phenomena and studying the Earth as a complete system. The program envisions a series of EOS-A and EOS-B spacecraft in popular orbit, each with a suite of instruments to allow simultaneous measurement of rapidly changing phenomena and intercorrection of instrument measurements. The first large platform (EOS-A) is scheduled for launch in fiscal year 1999. The Administration is currently conducting an external engineering review of the EOS program.

A key element of the EOS program is the Earth Observing System Data and Information System (EOSDIS). One of its major functions is handling the distribution, storage, and archiving of the data obtained from the EOS spacecraft. EOSDID will also incorporate data from instruments on other U.S. and foreign Earth observation spacecraft. An indispensable complement to the EOSDIS effort is support for scientific research and data analysis activities.

Another extremely important part of the Mission to Planet Earth is the Earth Probes program. Earth Probes instruments will be flown on small and medium-sized satellites to obtain high-priority data in the near term or data which cannot be obtained by the EOS spacecraft. Precursor missions, including TOPEX/Poseidon and the Upper Atmospheric Research Satellite, will be flown in the next several years to improve our understanding of terrestrial, atmospheric, and oceanic processes. Finally, data from operational satelites, including Landsat and the environmental satellites operated by the National Oceanic and Atmospheric Administration, are essential to the Global Change Research Program.

Committee views

Earth Observing System

The Committee strongly supports the Mission to Planet Earth program because of its potential to dramatically improve our understanding of the Earth's environment and global change phenomena, including the impact of human activities on the environment. The Committee remains very concerned that the Earth Observing System program is not sufficiently resilient with respect to future budget shortfalls. Future budget constraints may lead to smaller funding levels than required to keep the original program on schedule, especially in a program with such large future funding requirements, and the only choice might be to further delay the large first platform. Already, a shortfall in the expected fiscal year 1992 budget request has forced deletion of one major instrument from the first EOS satellite, a delay in the launch of the first EOS satellite, and a delay in developing instruments for follow-on satellites. Cost overruns and technical difficulties in a program of this complexity may also cause delays and reduction in capability.

Some in the technical community have argued that the EOS program lacks resilience because all of the proposed instruments for EOS–A are placed on one large platform. This may lead to greater technical complexity and, in addition instruments and spacecraft systems must be developed in parallel, leading to the potential for highly interactive schedule and cost risks. On the other hand, others argue that a single large platform, if it could be funded, would be the lowest cost approach to flying the suite of instruments presently envisioned.

The Advisory Committee on the Future of the U.S. Space Program found that "a combination of different size spacecraft appears to be most appropriate to meet the needs of simultaneity, accuracy, continuity, and robustness." The Committee notes that while the large platform concept addresses scientific requirements for simultaneity, these requirements are not absolute and other objectives,

including continuity, program resilience and early return of data, are equally important.

As a result of the Augustine Committee's recommendation, the Administration is conducting an external engineering review of the EOS program. The results of this review will be essential for determining the future structure of the Mission to Planet Earth program. The Committee encourages this review panel to carefully examine the structure and content of the entire EOS program, including the first EOS-A satellite, and take concrete steps to make the program more resilient. The Committee recommends that the review panel consider the advantages and disadvantages of all available alternatives. If future budgets fall short of expectations, it is essential that the recommended alternative allow parts of the program to proceed on schedule while less urgent parts are deferred. The Committee also urges the review panel to consider the role of Landsat in the Mission to Planet Earth effort.

In the absence of the report of this external engineering review panel and an affordable plan for the EOS program, the Committee is not prepared to move forward with the proposed program. The Committee has reduced the Earth Observing System program without prejudice pending receipt of the report by $75,000,000 in fiscal year 1992, which represents approximately half of the requested increase.

The Committee has provided for ten percent real growth in the total budget for Earth Science and Applications in fiscal years 1993 and 1994, which reflects the Augustine Committee recommendation for ten percent real growth for NASA. The Committee would consider increasing the allocations for fiscal years 1992, 1993 and 1994 pending the submittal of the report of the external engineering review, as well as NASA's response, and the identification of an adequate budget "wedge" for the Earth Observing System.

The Committee notes the current lack of a U.S. launch vehicle capability with a payload capacity to polar orbits intermediate between that of the Atlas E and Titan IV launch vehicles. Establishing such a capability requires modifications and additions to the current facilities at Vandenberg Air Force Base and modifications to existing launch vehicles. The Committee recommends that NASA work with the Department of Defense (DOD) to ensure that any facilities planned by the DOD will also be available for use by NASA and any launch vehicle modifications take into account NASA's potential needs.

EOS Data and Information System

The Committee recognizes that NASA has devoted considerable attention and resources to the EOS Data and Information System (EOSDIS). The Committee views the EOSDIS as the most challenging aspect of the Mission to Planet Earth program and the key to obtaining the maximum benefits from our investment in this program. The Committee recommends that NASA maintain the schedule for the EOSDIS procurement and continue rapid deployment of the EOSDIS Version 0.

The Committee further recommends that NASA plan to incorporate data from other U.S. and foreign environmental satellites, both current and planned, in the operational version of EOSDIS.

Use of existing data sets from other environmental satellites in prototype versions of the EOSDIS does not satisfy the need to integrate data sets from all available sources and make them accessible on a long-term basis. The Committee believes that NASA needs to work more closely with the international community to assure compatibility between the EOSDIS and data obtained from foreign Earth observation spacecraft, and reduce unnecessary duplication between U.S. and foreign programs.

Landsat Data Purchase

The Committee notes the consensus of the scientific community, as reflected in a report last year by the National Academy of Sciences, that Landsat data are sufficiently important to global change research that they should be incorporated in the EOSDIS. The Landsat data archives constitutes a two-decade record of environmental changes. Furthermore, while data from the EOS will not be available until 1999 or later, Landsat data are available now. Even after EOS–A is launched, Landsat data will constitute a valuable complement to the data from the EOS instruments.

The Committee has made $5,000,000 available only for the purchase of Landsat data for the Global Change Research Program. The Committee intends that NASA and the private operator should reach a mutual agreement on an equitable and low-cost price for Landsat data for the Global Change Research Program.

The Committee believes that NASA and the private operator of Landsat should take full advantage of the flexibility provided by the Land Remote-Sensing Commercialization Act of 1984, Public Law 98–365, as amended, which allows the private operator of the Landsat system to provide data at reduced prices for any research and development programs if a complete disclosure of the results of the research and development is made publicly available and the data are not used for commercial purposes or in substantial competition with data available directly from the Landsat operator. The Committee notes that two-year-old Landsat Multi-Spectral Scanner data are available at 25 percent of the nominal price, reflecting the approximate marginal cost of reproduction and distribution. The Committee expects that arrangements could be made to provide new and archived Thematic Mapper data in a like manner.

The Committee does not view this data purchase program as a long-term solution to the problem of Landsat data continuity. The Committee urges NASA to coordinate with the other agencies involved in the U.S. Global Change Research Program to make more permanent arrangements which assure the availability of Landsat data to the civilian community. The Committee recognizes that this is not an issue for NASA alone, but as the agency responsible for collecting environmental observations from space for the Global Change Research Program, NASA should take the lead within the Committee on Earth and Environmental Sciences and the National Space Council to ensure that Landsat data will be available to the global change research community. The Committee believes that taking advantage of existing capabilities such as Landsat will enhance the cost-effectiveness of the Mission to Planet Earth program and provide important data sooner. The Committee believes that the fact that Landsat has commercial as well as scientific ca-

pabilities should not deter this country from continuing a program whose dividends have been so great.

The Committee also notes with great concern the possibility that a significance fraction of Landsat imagery acquired since 1972 will be lost in coming years as storage media degrade or the original processing systems become inoperable. The Committee believes that the Landsat data archive represents the fruits of a $1.5 billion public investment in Landsat and contains incredibly valuable information on the environment. The Committee recognizes that NASA is not the agency responsible for the data archives, but urges NASA to work with other responsible agencies to ensure that this data archive is transferred to more permanent storage media and incorporated to the expent practicable into the EOS Data and Information System (EOSDIS). The Committee believes that the Land Remote Sensing Commercialization Act, as amended, provides a sufficient mechanism for providing archived Landsat data to the EOSDIS.

Procurement of long-lead parts for a follow-on to Landsat 6

The Committee notes with great concern the possibility that the delay in approval for a follow-on to Landsat 6 may lead to a significant gap in data continuity. Landsat 6 is schuduled to be launched in June 1992 and will nominally last until mid-1997. Once a decision is made to procure a Landsat 6 follow-on, as much as a year might be required to negotiate a contract. Construction of the satellite would then require at least four to five years. If follow-on parts are procured beginning in fiscal year 1992, the schedule for building a follow-on to Landsat 6 could be shortened by as much as six months to one year, reducing the likeihood of a data gap. The Committee notes that the recent delay in the launch of Landsat 6 has been caused by problems obtaining such parts.

The Committee recognizes that fundamental decisions about funding sources, institutional arrangements, and technical requirements must still be made before a follow-on staellite to Landsat 6 is approved. Nevertheless, the Committee believes that continuing the Landsat system is essential for global change research, national security applications, and other civilian and commercial uses. Because many of the follow-on parts required for the Landsat spacecraft and Enhanced Thematic Mapper are generic, and could be used on polar orbiting and other spacecraft currently being procured NASA, the Department of Defense, and the National Oceanic and Atmospheric Administration (NOAA), the procurement of these parts would not commit the Government to funding a follow-on satellite. The Committee intends to work with the other committees in Congress and the Administration to develop a policy consensus on the future of the Landsat system, with the hope that this consensus will be accomplished in time to include funding in the fiscal year 1993 budget.

The Committee has provided $5,000,000 in NASA's budget procure long-lead parts and intends to provide $5,000,000 in NOAA's budget and work to include additional funding in the Department of Defense budget. The Committee intends that NASA work with these other agencies to determine which long-lead parts should be procured based on their impact on the Landsat construction sched-

ule and their commonality to programs underway within each agency.

Earth Probes

The Committee strongly supports an aggressive Earth Probes program. The Earth Probes program, consisting of both small and medium-size spacecraft, will allow important global change phenomena nto be observed and studied in the near term, including investigations which cannot be carried out by the Earth Observing System. The Committee believes that the Earth Probes program is as important to our understanding of global change phenomena as EOS. Budgetary problems which might occur in the EOS program should not be allowed to adversely impact the content or schedule of the Earth Probes program.

In order to conduct the Mission to Planet Earth as a continually evolving program, as recommended by the Augustine committee, the Committee urges NASA to maintain sufficient flexibility in its program and budget planning to respond quickly to new needs as they arise. The Committee believes that the Earth Probes program can serve to shorten the time between the generation of new scientific and environmental monitoring ojectives and the return of relevant data from space.

The Committee notes with concern that the requested funding for Tropical Rainfall Measurement Missioin (TRMM) is lower in fiscal year 1992 than the funding provided in fiscal year 1991 and regrets the deletion of the Earth science attached payloads from the space station. Accordingly, the Committee has added $10,000,000 for Earth Probes to accelerate development of TRMM and to make alternative arrangements to fly the attached payloads deleted from the space station program.

Section 4(a)(1)(G) Materials Processing in Space

President's request for fiscal year 1992 and estimate for subsequent years:	
Fiscal year:	
1992	$125,800,000
1993	201,400,000
1994	233,600,000
Committee recommendation:	
Fiscal year:	
1992	115,800,000
1993	201,400,000
1994	233,600,000

Committee authorization recommedation

Section 4(a)(1)(G) authorizes the appropriation of $115,800,000 in fiscal year 1992 for Materials Processing in Space. The Committee intends that the reduction of $10,000,000 from the President's request in fiscal year 1992 be applied to the Space Station Utilization budget line. The Committee adopted language which transfers $6,000,000 from the Space Station Utilization budget line in Materials Processing in Space to the Physics and Astronomy budget line for alternative flight provisions for the physics and astronomy attached payloads deleted from the space station. The remaining reduction of $4,000,000 in fiscal year 1992 reflects the effects of the

restructured Space Station program and the need to transition the utilization activities to life science after Permanent Manned Capability. In such case, materials science facilities and equipment scheduled to be available only after the PMC milestone will need to be reassessed. Section 4(a)(1)(G) also provides $201,400,000 in fiscal year 1993 and $233,600,000 in fiscal year 1994, in accordance with the President's request.

Program description

The Materials Processing in Space program uses the microgravity environment to conduct research in fundamental science, materials science, and biotechnology. The program includes ground-based research, Spacelab and space shuttle payload development and operations, and space station utilization planning and payload development.

Committee views

Reduction in funding for Space Station utilization

The Committee believes that NASA should make other arrangements to fly the attached payloads deleted from the space station, which were supported in previous years by the Space Station Utilization budget line. Accordingly, the Committee has transferred $6,000,000 from the Space Station Utilization line in Materials Processing in Space to the Physics and Astronomy line. In addition, the Committee has made an additional general reduction to the Space Station Utilization line, reflecting the Committee's concern that the programs to develop large materials processing facilities for the space station are not under control and that materials processing facilities scheduled to be available after Permanent Manned Capability should be reassessed.

Section 4(a)(1)(H) Communications

President's request for fiscal year 1992 budget and estimates for subsequent years:	
Fiscal year:	
1992	$39,400,000
1993	34,700,000
1994	31,000,000
Committee recommendation:	
Fiscal year:	
1992	39,400,000
1993	34,700,000
1994	31,100,000

Committee authorization recommendation

Section 4(a)(1)(H) authorizes the appropriation of $39,400,000 in fiscal year 1992, $34,700,000 in fiscal year 1993, and $31,100,000 in fiscal year 1994 for Communications, in accordance with the President's request.

Program description

The main activity in communications is the Advanced Communications Technology Satellite (ACTS) program, including development of terminals for use in the ACTS experiments program. The ACTS launch is scheduled for fiscal year 1993. Other components of

the communications program include research and hardware development for advanced communications concepts, research and development for the search and rescue program, and radio science studies.

Committee views

ACTS Experiments Program

The Committee strongly supports the transfer of the ACTS experiments program to the Office of Commercial Programs, which the Committee believes will place a greater emphasis on industry involvement. However, the Committee is concerned that the funding intended for an industry experiments program using ACTS may be excessively diluted by institutional expenditures and non-ACTS research activities of new Centers for the Commercial Development of Space (CCDS) if additional funds are not made available. The Committee believes that funding intended for an industry experiments program using ACTS should be sustained at a level that will guarantee direct ACTS utilization by industry and that this should be over and above resources directed at the establishment of the CCDSs.

Section 4(a)(1)(I) Information Systems

President's request for fiscal year 1992:	
Fiscal year 1992	$42,000,000
Committee recommendation:	
Fiscal year 1992	42,000,000

Committee authorization recommendation

Section 4(a)(1)(I) authorizes the appropriation of $42,000,000 in fiscal year 1992 for Information Systems. NASA plans to eliminate this budget line beginning in fiscal year 1993 and distribute its activities to other functions within the Office of Space Science and Applications.

Program description

The objective of the information systems program is to provide advanced data systems required to support flight projects in the Office of Space Science and Applications. In addition, in fiscal year 1992 NASA plans to initiate an effort to revitalize current space science data holdings.

Committee views

Funding for preserving existing data and handling new data

Major science missions during the 1990s will lead to an explosion in data received. NASA's data archiving and distribution system will be severely stressed. Advances in information and data management systems are required if NASA is to support the need of the scientific community to access this data. In addition, NASA's previous efforts to preserve existing data archives have been found to be inadequate.

The Committee is concerned that the elimination of this budget line in future years will result in a reduced emphasis on preserving existing space science data and developing systems to cope with the

torrents of new scientific data expected in the 1990's. The Committee urges NASA to provide the information systems program with the resources needed to preserve the existing data collected over the last 30 years and deal with the anticipated influx of new space science data.

Section 4(a)(1)(J) Technology Utilization

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$32,000,000
1993	31,700,000
1994	33,000,000
Committee recommendation:	
Fiscal year:	
1992	27,000,000
1993	29,700,000
1994	33,000,000

Committee authorization recommendation

Section 4(a)(1)(J) authorizes the appropriation of $27,000,000 in fiscal year 1992, $29,700,000 in fiscal year 1993, and $33,000,000 in fiscal year 1994 for Technology Utilization.

Program description

The objectives of NASA's technology utilization programs are (1) to accelerate the application of new technology by the private sector; (2) to encourage secondary uses of NASA technology in non-aerospace fields, in both the public and private sectors; and (3) to develop applications of NASA's aerospace technology to meet non-aerospace needs. A network of Industrial Applications Centers (IAC's) and technology utilization officers at NASA centers form the core of the agency's technology transfer efforts. An open competition is planned to replace the current network of IAC's with six new centers geographically distributed around the country.

Committee views

Reduction in rate of funding increase

The Committee strongly supports efforts to make NASA's technology transfer program more effective but believes that this can be accomplished within a more modest budget envelope. The Committee does not believe that the requested growth of more than thirty percent in fiscal year 1992 can be accommodated, especially given the large overall budget growth requested by the Office of Commercial Programs. Accordingly, the Committee has applied a general reduction of $5,000,000 to Technology Utilization in fiscal year 1992. The Committee believes that all activities within this budget line should share in the general reduction.

Section 4(a)(1)(K) Commercial Use of Space

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$118,000,000
1993	144,200,000
1994	137,400,000

Committee recommendation:

Fiscal year:	
1992	$107,000,000
1993	138,200,000
1994	134,400,000

Committee authorization recommendation

Section 4(a)(1)(K) authorizes the appropriation of $107,000,000 in fiscal year 1992, $138,200,000 in fiscal year 1993, and $134,400,000 in fiscal year 1994 for Commercial Use of Space activities. The reduction from the President's request is without prejudice and shall be accommodated by means of a general reduction. The Committee takes this action reluctantly, but the rapid increase in funding required for the major flight programs envisioned must fit into the overall funding allocation that is likely to be available for NASA.

Program description

The Commercial Use of Space program primarily supports a network of sixteen Centers for the Commercial Development of Space (CCDS). The CCDSs are located at state and private universities and research institutes. The purpose of the CCDS program is to encourage increased private sector investment in research geared toward examining potential commercial uses of space.

The scientific and engineering researchers at the CCDSs are supported by basic grants of approximately $1 milion per center. In addition, NASA funds payload development, payload integration, shuttle integration, and transportation into space for CCDS experiments. NASA's support to the CCDSs totals over $100 million in the fiscal year 1992 budget request, nearly double the fiscal year 1991 budget. The remainder of this account supports commercial development studies, headquarters support contracts, and NASA field center collaborative work with industry.

Committee views

Budgetary growth associated with flight programs

The Committee is encouraged by NASA's ambitious plans for its Centers for the Commercial Development of Space (CCDS). The Committee nevertheless believes that the large bulge in the budget of the Office of Commercial Programs (OCP) over the next three fiscal years cannot be achieved in the current constrained budget climate. The Commercial Use of Space budget request for fiscal year 1992 is nearly twice the fiscal year 1991 budget. Most of this bulge is attributable to the simultaneous initiation of two space transportation projects, Spacehab and COMET, which are intended to provide flights for experiments developed by NASA's CCDSs. For this reason, the Committee has made a general reduction of $11,000,000 in fiscal year 1992. This authorization still provides a greater than 70 percent increase in funding in fiscal year 1992.

The Committee notes that the practice of "front loading" commercial service contracts in order to establish a basis for investor confidence presents Congress with an untenable situation. That is, such contracts must be funded or such companies will encounter severe financial disruption. In addition, Congress must provide an

inordinate amount of funding initially compared to the services received. The Committee intends to review the possibility of providing NASA with termination liability authority to alleviate these problems.

Industrial participation

The Committee is encourage by the large number of industrial affiliates who have worked with or expressed interest in the research being done by the CCDSs. However, a smaller number of these firms have provided significant cash support to the CCDSs and industry cash support remains a small percentage of total cash and in-kind support to the CCDS program. The Committee believes that it is essential that all of the research performed at the CCDS be driven by interest from industry and receive direct financial support from industry. The Committee believes that the best measure of industrial interest in a project is direct financial (cash) support. The accounting methods for estimating the dollar value of in-kind support such as personnel and equipment do not appear to be consistent across the CCDSs and may not accurately reflect the value industry would place on this support. If NASA plans to continue using in-kind contributions as a measure of industry support, it should develop uniform standards for determining the value to industry of such contributions.

The Committee recommends that NASA consider ways to provide each center with greater incentives for obtaining industry funding for projects they propose to undertake. A matching fund program, whereby NASA provides a lower level of basic grant funding than it currently provides but matches industry cash contributions on a one-for-one or two-for-one basis up to some limit, would be one option for accomplishing this objective. Another option would be to prioritize payloads for flight based not just on technical merit but also on the amount of cash support received from industry. Projects with greater levels of industry support and equal technical merit should fly before projects with lower levels of support. A third option would be to require new CCDSs to list in their proposals the financial support from industry they will obtain if they receive a specific level of NASA support. NASA could evaluate the proposal based on the level of industry support and the credibility of such estimates.

Furthermore, the Committee notes that three of the CCDSs have received extremely little or no cash from industry. NASA originally planned to support the centers for only the first five years, after which time the centers would either become self-sustaining or would be discontinued. The Committee recommends that NASA consider periodically recompeting the contracts for CCDS status. New groups of researchers and industry partners might be better able to take advantage of NASA's support. Since NASA is planning to issue a request for proposals for one or two new centers to concentrate on satellite communications research, the Committee recommend that NASA consider recompeting the contracts for the three CCDSs that have not attracted industry funding and maintain the total number of CCDS at sixteen. Maintaining a fixed number of CCDSs at this time is consistent with the inability to

provide all of the large budget growth requested by the Office of Commercial Programs.

The Committee requests that NASA provide it with a report, by November 1, 1991, outlining NASA's plans for increasing the incentives for centers to obtain industry cash support, describing NASA's review process for evaluating the level of industry support obtained by the centers, and describing NASA's plans for periodically recompeting the CCDS contracts. The Committee also strongly suggests that NASA require each CCDS to include in its annual report to NASA a detailed breakdown of cash and in-kind support received from industry.

Section 4(a)(1)(L) Aeronautical Research and Technology

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$591,200,000
1993	670,500,000
1994	716,000,000
Committee recommendation:	
Fiscal year:	
1992	591,200,000
1993	670,500,000
1994	716,000,000

Committee authorization recommendation

Section 4(a)(1)(L) authorizes $591,200,000 for fiscal year 1992, $670,500,000 for fiscal year 1993, and $716,000,000 for fiscal year 1993 for the Aeronautical Research appropriations.

Program description

The goal of the NASA Aeronautical program is to conduct research and develop technology to strengthen U.S. leadership in civil and military aviation. This goal is supported by five comprehensive program objectives:

(1) emphasize emerging techologies with potential for order-of-magnitude advances in capacity or performance which will enhance the U.S. defense and economic competitiveness; (2) maintain NASA's laboratory strength by repairing and modernizing critical aging national facilities, providing advance scientific computational capabilities and enhancing staff technical excellence; (3) ensure the timely transfer of research results to the U.S. aeronautics community through reports, conferences, workshops, and active participation of industry in cooperative research programs; (4) ensure the strong involvement of universities in NASA's program to broaden the nation's base of technical expertise; and (5) facility support to the Department of Defense (DOD), other government agencies, and the U.S. industry for major aeronautical programs.

Committee views

The Committee has recommended in the past that NASA increase its cooperative efforts with FAA and is pleased to see this as a major effort in the FY 1992 budget proposal. The areas chosen for emphasis between NASA and FAA include severe weather, human factors and air worthiness, among other things. The Com-

mittee strongly supports this effort and urges NASA to increase long-term research efforts in aging aircraft research, nondestructive evaluation, fire safety and other areas that will prevent aviation accidents from occurring.

The advanced Composite Technology program continues to provide support for polymer matrix composite development and cost reduction based on performance projections that continue to be unrealistic in relation to accomplishments. A balanced program is needed between polymer matrix composites and monolithic aluminum alloys in order to assure that backup materials are available if the polymer goals are not reached. Funding for advanced aluminum development for both wide-body transports and the High Speed Commercial Transport, therefore, needs to be emphasized. Structural material research for HSCT must be accelerated in order to meet the time frame for materials selections in 1995 to support certification early in the first decade of the next century.

Section 4(a)(1)(M) Transatmospheric Research and Technology

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$72,000,000
1993	120,000,000
1994	145,000,000
Committee recommendation:	
Fiscal year:	
1992	72,000,000
1993	120,000,000
1994	145,000,000

Committee authorization recommendation

Section 4(a)(1)(M) authorizes $72,000,000, for fiscal year 1992, $120,000,000 for fiscal year 1993, and $145,000,000 for fiscal year 1994 for Transatmospheric Research and Technology.

Program description

The transatmospheric research and technology program is a portion of the joint NASA/Department of Defense (DOD) National Aero-Space Plane (NASP) program. The program objective is to develop and then demonstrate, in experimental flight vehicles, the technology required to permit the Nation to develop reusable, single-stage-to-orbit (SSTO) vehicles with air breathing primary propulsion and horizontal takeoff and landing.

Committee views

The Committee finds that the Administration's expression of strong support for NASP is very welcome. Moreover, the OSTP, DOD, NASA, and the USAF testimony that the program is a top priority, has both civil and military applications, and should be funded through Phase 3, should assure Congress that it will move forward as scheduled. The Committee also expresses continued strong support for the NASP research program.

National Aero-Space Plane program

The National Aero-Space Plane (NASP) program was originally established by President Reagan as a high national priority in the January 1965 State of the Union address. A joint program was immediately established between the Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA) in July 1986.

The Program is divided into three phases. Phase 1 was the concept feasibility study (called Copper Canyon) which ran from 1982 to 1985 and and was essentially a pre-NASP phase. The study results defined the technical concept for the NASP program to be developed on Phases 2 and 3. Buth phases have been revised since the first joint agreement.

The goal of Phase 2, the Concept Validation program, is to prove the relevant technologies are sufficiently mature to support the development of an experimental vehicle, the X-30. At the completion of Phase 2 in 1993, the progress in technology development will be assessed to determine if it is feasible to continue to Phase 3 in which two prototype vehicles would be manufactured and flown with the first flight in 1997. This schedule calls for a singlr-stage-orbit in 1999. These X-30 vehicles will be experimental vehicles with no operation missions or requirements.

The technologies that must be developed for the X-30 to fly include:

(a) a propulsion system designed primarily as an air-breathing multi-cycle ram/scramjet capable of operating on hydrogen fuel to speeds of approximately Mach 25.

(b) advanced materials in the airframe, engine and other parts of the aircraft that can withstand the high temperatures generated up to Mach 25 and still be completed reusable;

(c) a completely integrated engine and airframe that can operate effectively under a wide variety of speeds, temperatures, altitudes and flight conditions; and

(d) supercomputer technology capable of analyzing the aerodynamics of the integrated X-30 system.

The Administration approved on January 12, 1990 a joint teaming arrangement with all the major contractors currently working on the project. This will avoid a "down select" at the conclusion of Phase 2 and will preserve access to the best expertise of all parties.

Propulsion.—Currently, the best air-breathing aircraft operate at speeds well below Mach 4. (Mach 1 is equal to the speed of sound which is 760 m.p.h. at sea level.) One concern has been the adequacy of facilities to test the scramjet engines at speeds (Mach 4 to 25) for which the engines have not previously been tested. The team has successfully tested one-seventh to one-quarter scale engines to Mach 8. Full-scale engine components have been tested up to Mach 6 and performances equalled and exceeded original expectations.

Advanced materials.—Some sections of the X-30 are projected to be exposed to temperatures of 5,000 degrees Fahrenheit or higher during flight. Existing aircraft materials cannot withstand such heat, so the NASP Program must develop new materials and active cooling techniques that have this capability and are reusable. Very good progress is being made by the NASP team which includes a

unique management arrangement for a joint research effort by all the NASP contractors. In fact, for several materials, the normal fifteen-year cycle between laboratory experiment and structural fabrication was compressed to only four years.

Integration of engine and airframe.—The effective performance of a scramjet will depend on the efficient flow of air into the engine, which in turn depends upon the shape of the airframe. The underside of the aircraft will be the air inlet to compress air for the engine as well as the engine's exhaust nozzle. Consequently, the engine must be completely integrated with the airframe. This may well be one of the most complex engineering integration problem ever undertaken. Nevertheless, the progress to date is very gratifying.

Supercomputer technology.—Because of the advances in supercomputer technology, it is possible to analyze the integrated performance through computational fluid dynamics (CFD). As a result of the use of CFD, analysis of mixing, combination and engine performance is ahead of schedule. Results to date have indicated that propulsion systems for the X–30 are feasible up to the maximum speeds needed to low orbit entry. In turn, the X–30 experimental flight data are essential to validate the CFD calculations.

Congressional and other related activities.—The Committee has supported the NASP Program, contained in the Administration's NASA budget request, every year since the creation of the program. The funding history is presented in Table 1.

TABLE 1.—NASP FUNDING

[In millions of dollars]

	Fiscal year—			
	1986–89	1990	1991	1992
DOD	569	194	163	233
NASA	237	60	95	72
Total	806	254	258	305

The President's Science Advisor, Dr. Allan Bromley testified at the March 12, 1991 Joint Armed Services—Science Committee hearing. He said, "The National Aero-Space Plane is a sterling example of government-industry cooperation in advancing generic technologies that promise broad application in both the defense and the commercial realms. And, in my view, many of these technologies will be of key importance to our Nation's competitive standing."

Dr. Bromley went into more detail about the teaming arrangement. "The government-industry relationship is also unique in that government laboratories and research centers have responsibility for explicit pieces of work on the program's main development path. This is a significant departure from the customary generic R&D role of government researchers."

Regarding the expected 1993 decision to move to Stage 3, the actual construction of an aircraft, Dr. Bromley was very specific:

> From everything I know of the program's maturity and progress, I would say that the national team shoud be in excellent shape to meet the Phase 2 exit criteria in FY 93. Once those criteria are met, I would be strongly in favor of moving forward to Phase 3. In my opinion, limiting our efforts to a generic hypersonic technology program after Phase 2 would not ensure that U.S. a technological lead. I also believe a generic technology program alone would not provide the foundation for an experimental flight vehicle program, because the highly qualified contractor team would be disbanded and integrated vehicle design activities—the heart of hypersonic flight—would cease.

J.R. Thompson, Deputy Administrator of NASA concluded at the March 12 joint hearing,

> NASA remains very strongly committed to NASP. The NASA Research Centers continue to be a vital part of the dynamic national team for NASP technology development. We are pleased to work with the Department of Defense and the National contractor team toward their next major program milestone: the 1993 decision on whether to build and fly the X-30. We believe that the NASP epitomizes the type of advanced technology programs NASA and the Nation should be doing; pushing technology well beyond its current limits to help ensure continued U.S. aerospace preeminence.

Also during the same hearing, Dr. Charles Herzfeld, Director of Defense Research and Engineering at DOD, stated, "I'm pleased to offer my views on the Administration's strong commitment to pursue the goals of the National Aero-Space Plane (NASP) program. It is an important program to the Department and the Nation."

Dr. Herzfeld listed three important reasons why DOD supported the NASP program.

> First, if the NASP program achieves its goals, the potential military benefits could be important. Vehicles derived from a successful NASP program could provide much needed rapid, cost-effective, flexible, and reliable access to space. They could also provide extended hypersonic atmospheric cruise capability for several candidate military missions. This is not only my personal view but the view of the Joint Chiefs of Staff the NASP program is strongly supported by the Strategic Air Command and the Air Force Space Command, again because of the potential military benefits that a successful NASP program would offer. Second, the current NASP technology development efforts will yield technology that is valuable in other areas of defense, including aircraft and missiles. The third reasons for continued DOD support is that the program is making good progress.

Dr. Herzfeld concluded with, "In summary, DOD remains strongly committed to the NASP program."

Section 4(a)(1)(N) Space Research and Technology

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$354,800,000
1993	321,700,000
1994	317,200,000
Committee recommendation:	
Fiscal year:	
1992	314,800,000
1993	321,700,000
1994	317,200,000

Committee authorization recommendation

Section 4(a)(1)(N) authorizes $314,800,000 in fiscal year 1992 for Space Research and Technology activities. This represents a decrease of $40,000,000 below the President's request, reflecting the deletion of the $55,000,000 Flight Telerobotic Servicer project, and the reallocation of $15,000,000 to other automation and telerobotic activities.

Section 4(a)(1)(N) also authorizes the appropriation of $321,700,000 in fiscal year 1993, and $317,200,000 in fiscal year 1994 for Space Research and Technology activities. These authorization levels are equal to the Administration's estimates for those years.

Program description

The overall goal of the Space Research and Technology program is to ensure continued U.S. leadership in space by providing advanced, enabling technologies, validated at a level suitable for user-readiness, for future space missions. To achieve this goal, a broad base of advanced technology is required for vehicle and subsystem concepts, components, devices, and software. This is achieved by developing technical strengths in the engineering disciplines within NASA, industry, and academia and performing critical technology validations that facilitate the transfer of new technology with a high level of confidence to future space missions.

Committee views

Flight Telerobotic Servicer

The Flight Telerobotic Servicer (FTS) was a teleoperated robotic system that was being developed for use in the assembly and maintenance of Space Station Freedom. The critical design review (CDR) for the FTS demonstration test flight (DTF-1) was completed in the fall of 1990. However, the Space Station program office decided to delete the FTS development from the Space Station program. In the fiscal year 1992 budget request, NASA has transferred the FTS program to the Space Research and Technology budget line. It would account for the majority of the funding requested for space automation and robotics in fiscal year 1992. NASA has indicated that it will review the current FTS program plan to see whether it should be modified. The Committee believes that since the original mission of the FTS has been eliminated, the NASA telerobotics program should be structured in a way that maximizes the long-term technological gains to be realized from the program. In addi-

tion, the program should contribute to the development of U.S. commercial capabilities in teleoperated robotic systems. Two other areas in which research and development activity could provide real benefits are in teleoperated Space Station or free-flyer payload technologies, and in the development of micro rover and other microtechnology applications for lunar and planetary exploration.

The Committee therefore reduces the funding requested for the FTS program by $40,000,000. The remaining balance of $15,000,000 is provided for research on telerobotics, teleoperated payload technologies, and for research on applications of microtechnology to robotic space exploration.

High capacity power

The Committee believes that the High Capacity Power program should pay a significant role in meeting the needs of NASA's Civil Space Technology Initiative. Further, high capacity power systems for space applications have the potential for dramatic cost savings in spacecraft heat-to-electric conversion systems. Accordingly, the Committee encourages NASA to continue to emphasize the development of this technology.

Section 4(a)(1)(O) Exploration Activities

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	67,000,000
1993	88,000,000
1994	102,400,000
Committee recommendation:	
Fiscal year:	
1992	61,000,000
1993	88,000,000
1994	102,400,000

Committee authorization recommendation

Section 4(a)(1)(O) authorizes $61,000,000 in fiscal year 1992. The reduction from the President's request for FY 1992 shall be accommodated by means of a general reduction of $6,000,000. Section 4(a)(1)(O) also authorizes $88,000,000 in fiscal year 1993, and $102,400,000 in fiscal year 1994 for Exploration Activities.

Program description

The Exploration Activities budget line funds Exploration Technology and Exploration Mission Studies. The Exploration Technology program is intended to develop advanced technologies that will support not only the Space Exploration Initiative (SEI), but will also be applicable to other areas of the nation's civil space effort.

Exploration mission studies are intended to develop the preliminary technical, scientific, and programmatic data needed to allow future decisions on the proper approach to human and robotic exploration of the Moon and Mars. In fiscal year 1992, the Exploration Mission Studies are to incorporate the findings of the Synthesis Group's studies into its analyses.

Committee views

SP–100 Reactor program

The SP–100 program is a joint activity of NASA, the Department of Defense, and the Department of Energy. The objective of the program is to develop a space nuclear power system. Since the program was initiated in the early 1980s, it has undergone several rephasings and the milestones have been delayed. The Committee is concerned that NASA's exploration requirements are not adequately addressed in the SP–100 program, especially since NASA's requirements include the capability to provide power on planetary surfaces under harsh conditions, whereas the Department of Defense requirements are focussed more on the development of an in-space system. The Committee would like to be kept informed about the status of the exploration-related aspects of the SP–100 program and how the exploration-related requirements for the program are being addressed.

Synthesis Group

The Synthesis Group has been examining alternative approaches to the conduct of the Space Exploration Initiative. The Synthesis Group is scheduled to report its findings in April 1991. The Committee is interested in how NASA will respond to the report of the Synthesis Group and how NASA proposes to incorporate the findings into its Exploration Technology and Mission Studies activities. The Committee directs NASA to provide a report to the Committee on its response to the findings and recommendations of the Synthesis Group, as well as its plans for incorporating those finding into its activities in fiscal year 1992. The Committee requests that the report be delivered to Congress within six months of the release of the Synthesis Group's report.

The Committee further directs the Administrator, in coordination with the Chairman of the Synthesis Group, to establish from among the membership of the Synthesis Group, a core group of advisors to assist in the assessment by NASA and other participating agencies of the recommendations contained in the official report of the Synthesis Group. Such advisory group shall be provided administrative support by NASA.

Section 4(a)(1)(P) Safety, Reliability and Quality Assurance

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$33,600,000
1993	32,500,000
1994	34,000,000
Committee recommendation:	
Fiscal year:	
1992	33,600,000
1993	32,500,000
1994	34,000,000

Committee authorization recommendation

Section 4(a)(1)(P) authorizes $33,600,000 in fiscal year 1992 for Safety, Reliability, and Quality Assurance activities. This authorization is equal to the President's request.

Section 4(a)(1)(P) also authorizes $32,500,000 in fiscal year 1993 and $34,000,000 in fiscal year 1994 for Safety, Reliability, and Quality Assurance activities. These authorization levels are equal to the Administration's estimates.

Program description

The Safety, Reliability, and Quality Assurance program within NASA is intended to reduce the overall level of risk within the Agency's projects and activities. This is accomplished through such activities as the conduct of independent assessments, reviews, analyses, studies, and tests; the establishment of standards and guidelines; and the development of new inspection technologies, techniques, and devices.

Section 4(a)(1)(Q) Academic Programs

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$64,600,000
1993	70,500,000
1994	74,500,000
Committee recommendation:	
Fiscal year:	
1992	64,600,000
1993	70,500,000
1994	74,500,000

Committee authorization recommendation

Section 4(a)(1)(Q) authorizes the amounts contained in the President's request for fiscal years 1992 through 1994.

Program description

NASA's Academic Programs conduct aerospace educational programs and activities to inspire and support, in elementary through graduate school, students to prepare themselves for careers in science, engineering and technology. Funding initiated in fiscal year 1992 will allow for the continuation of the current program including the continuation of the Graduate Student Researchers program at the Kennedy Space Center.

Committee views

Educational goals of the Human Exploration Program

The Committee has considered NASA's contribution to the Nation's educational system one of the greatest benefits and highest priorities of the space program. The recent recognition of an overall decline in American educational standards compared to other industrialized nations makes this priority all the more important.

The Committee notes and commends the establishment of education as one of the long term goals of the Space Exploration Initiative. The Committee further recognizes that present extrapolations

of the science and engineering Phd work force necessary to carry out a robust Space Exploration Initiative falls short of what will be needed. Therefore, the Committee believes that NASA should undertake all practicable measures to assess and remedy this shortfall. These may entail a combination of societal educational programs aimed at secondary educational levels together with direct academic research programs which provide graduate and post graduate employment opportunities.

Section 4(a)(1)(R) Tracking and Data Advanced Systems

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$22,000,000
1993	23,200,000
1994	24,600,000
Committee recommendation:	
Fiscal year:	
1992	22,000,000
1993	23,200,000
1994	24,600,000

Section 4(a)(1)(R) authorizes the appropriation of $22,000,000 in fiscal year 1992, $23,200,000 in fiscal year 1993, and $24,600,000 in fiscal year 1994 for Tracking and Data Advanced Systems.

Program description

The Tracking and Data Advanced Systems program provides for higher performance, higher reliability, and more cost-effective tracking and data handling capabilities for future space missions. This program is the research and development component of the Office of Space Operations, which runs the ground and space networks and the control and data acquisition facilities supporting all space flight missions.

Section 4(a)(2)(A) Space Shuttle Production and Operational Capability

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1922	$1,288,900,000
1993	1,277,000,000
1994	1,210,500,000
Committee recommendation:	
Fiscal year:	
1992	1,358,900,000
1993	1,277,000,000
1994	1,210,500,000

Committee authorization recommendation

Section (4)(a)(2)(A) authorizes $1,358,900,000 in fiscal year 1992 to support Shuttle Production and Operational Capability. This represents an increase of $70,000,000 above the President's request. This increase is the combined effect of: a $30,000,000 increase in Orbiter Operational Capability to provide additional support to maintain the readiness of the Orbiter production line and related production activities of Orbiter sub-contractors; a $50,000,000 increase in Propulsion Systems reflecting a transfer in this amount from the Con-

struction of Facilities account to the Advanced Solid Rocket Motor program; and a $10,000,000 decrease in Assured Shuttle Availability deferring development of the Multifunction Electronic Display System. The Advanced Solid Rocket Motor program is authorized funding of $375,000,000.

Section 4(a)(2)(A) also authorizes $1,277,000,000 in fiscal year 1993 and $1,210,500,000 in fiscal year 1994 for Shuttle Production and Operational Capability. These authorization levels are equal to the Administration's estimates. However, the Committee questions the accuracy of these estimates given the lack of funding they provide for the Advanced Solid Rocket Motor program.

The Committee recognizes that the funds provided in fiscal year 1992 may not be sufficient to meet the needs of authorized Space Shuttle Production and Operational Capability programs. The Committee also recognizes that there may be additional funding flexibility within the space Shuttle Operations account. Accordingly, the Committee would entertain a request to transfer funds from the Space Shuttle Operations account into the Space Shuttle Production and Operational Capability account.

Program description

The objectives of the Shuttle Production and Operational Capability program are to provide for necessary design modifications and safety improvements to support the Space Shuttle; needed capabilities at the launch site and for the flight operations process; continued development and testing of propulsion systems; and replacement of obsolete systems to ensure the long-term viability of the Shuttle program.

Committee view

Orbiter production readiness

In 1989, the Committee directed NASA to develop a long-range plan for handling the production line for Space Shuttle Orbiters. The Committee expressed increasing concern for the lack of such a policy and the resulting year-to-year nature of NASA's plans for this important production capability. NASA was directed to develop this long-range plan and submit it to the Congress by March 1, 1990.

The Committee finally received an "interim report" on NASA's efforts to produce such a plan on August 10, 1990. The Committee was informed that it would receive a completed detailed plan by October 1990. The Committee still has not received this completed plan.

The Committee is concerned that this continual lack of definitive action on the part of the Administrator may threaten the viability of the Orbiter production line through the loss of key prime contractor and sub-contractor capabilities.

The Committee has stated in the past that it could understand a decision by NASA to close down this production line if it were consciously made and well supported. On the other hand, simply permitting this production line and those of its sub-contractors to atrophy because of indecision and inaction is not in the public interest.

Accordingly, the Committee has taken action to preserve this production capability by once again authorizing an agumentation of funding support for structural spares and maintaining the readiness of the Orbiter production line and related production activities of Orbiter sub-contractors.

The Committee expects NASA to move with all deliberate speed in completing the Committee-directed long-range plan for the Space Shuttle production line. Until the completion and acceptance of this plan by the Congress, NASA should take whatever steps are required to preserve this production capability until a decision is reached regarding how it should be handled over the long term.

Section 4(a)(2)(B) Space Shuttle Operations

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$3,023,600,000
1993	3,059,800,000
1994	3,161,200,000
Committee recommendation:	
Fiscal year:	
1992	2,970,600,000
1993	2,968,800,000
1994	2,897,200,000

Committee authorization recommendation

Section 4(a)(2)(B) authorizes $2,970,600,000 in fiscal year 1992 for Space Shuttle Operations. This represents a decrease of $53,000,000 below the President's request. This decrease is a result of the combined effect of: a $14,000,000 reduction in operating costs due to the cancellation of the Flight Telerobotic Servicer Space Shuttle mission in 1994, cancellation of the Space Shuttle "Flight Opportunity" in 1995, and movement of Aeroassist Flight Experiment Space Shuttle mission from 1995 to 1996; and a $39,000,000 reduction in operating costs due to anticipated efficiencies in the Space Shuttle program consistent with a goal of four percent savings per year in operating costs. The $39,000,000 reduction in operating costs is based on an assumed four percent savings minus the $85,000,000 savings reduction that has already been made by the Office of Management and Budget.

Section 4(a)(2)(B) also authorizes $2,968,800,000 in fiscal year 1993 and $2,897,200,000 in fiscal year 1994 for Space Shuttle Operations. The authorization for fiscal year 1993 is based on an Administration estimate of $3,059,800,000 and a reduction of $91,000,000. This reduction is the result the combined effect of: a $46,000,000 reduction is operating costs due to the cancellation of the Flight Telerobotic Servicer Space Shuttle mission in 1994, cancellation of the Space Shuttle "Flight Opportunity" in 1995, and movement of the Aeroassist Flight Experiment Space Shuttle mission from 1995 to 1996; and a $45,000,000 reduction in operating costs due to anticipated efficiencies in the Space Shuttle program consistent with a goal of four percent savings per year in operating costs. The $45,000,000 reduction in operating costs is based on an assumed eight percent savings minus the $217,000,000 savings reduction

that has already been made by the Office of Management and Budget.

The authorization for fiscal year 1994 is based on an Administration estimate of $3,161,200,000 and a reduction of $264,000,000. This reduction is the result the combined effect of: a $73,000,000 reduction in operating costs due to the cancellation of the Flight Telerobotic Servicer Space Shuttle mission in 1994, cancellation of the Space Shuttle "Flight Opportunity" in 1995, and movement of the Aeroassist Flight Experiment Space Shuttle mission from 1995 to 1996; and a $191,000,000 reduction in operating costs due to anticipated efficiencies in the Space Shuttle program consistent with a goal of four percent savings per year in operating costs. The $191,000,000 reduction in operating costs is based on an assumed twelve percent savings minus the $214,000,000 savings reduction that has already been made by the Office of Management and Budget.

Program description

Space Shuttle Operations provides for Space Shuttle launch services for NASA payloads, and, on a reimbursable basis, for those of the Department of Defense, other civil agencies, and certain commercial and international users. Within this account, flight hardware is produced, refurbished, and repaired; and manpower, propellants, and other materials are furnished to conduct and support both flight and ground operations. Operations funding also provides for the purchase of replacement spares for both flight and ground support hardware as existing inventories of spare parts are consumed as a result of flight-related activities.

Committee view

Cost savings in the space shuttle program

Two years ago, this Committee directed NASA to conduct a study to determine what efficiencies could be adopted within the Space Shuttle program to help offset the cost growth in excess of one billion that has occurred in the last several years. As stated in H.R. 1759, the National Aeronautics and Space Administration Multiyear Authorization Act of 1989, H. Rept. 101-226, the Committee encouraged NASA managers to be vigiliant for changes in organization, procedures, operations, staffing, hardware design, etc. which could result in a reduction in the funds required to support the Space Shuttle program while causing no reduction in quality and safety.

The Committee report which NASA submitted in April 1990 in response to this requirement largely contained initiatives that have been in existence for a long time, some of which even predated the Challenger accident.

The Committee continues to believe that it should be possible to achieve savings in the Space Shuttle program without sacrificing quality and safety. This belief has been reinforced by recent testimony to this Committee by key NASA officials.

For example, the Deputy Administrator testified on February 7, 1991 that it should be possible to reduce the annual cost of operating the Space Shuttle by 20 to 25 percent. Subsquently, on March

6, 1991, NASA's Associated Administrator for Space Flight testified that a 25 percent reduction in Space Shuttle operating costs could be taken as a goal and that he anticiapted that a target for achieving that goal would be to achieve savings of three to five percent per year for about five years. He added that the savings would have to be achieved this way in order to maintain safety.

The Committee strongly supports this continued emphasis that NASA is placing on maintaining quality and safety within the Space Shuttle program. Additionally, the committee also supports whatever actions NASA can take to achieve cost savings within this program without jeopardizing quality and safety. In this regard, the committee believes that the Associate Administrator for Space Flight's anticipated target of achieving three to five percent savings for a period of five years is a reasonable goal.

The Committee directs NASA to report to the Congress by March 1, 1992 on exactly how it would begin to achieve this annual cost savings of three to five percent in the Space Shuttle program.

Section 4(a)(2)(C) Launch Services

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$341,900,000
1993	281,000,000
1994	315,800,000
Committee recommendation:	
Fiscal year:	
1992	315,900,000
1993	289,000,000
1994	359,800,000

Committee authorization recommendation

Section 4(a)(2)(C) authorizes $315,900,000 in fiscal year 1992 for Launch Services. This represents a $26,000,000 decrease below the President's request. This decrease is a result of the combined effect of: a $24,000,000 reduction reflecting the Committee's deletion of funding for the MSAT launch vehicle; a $12,000,000 reduction reflecting savings that NASA will realize in purchasing a Titan IV launch in support of the CRAF/Cassini mission; and a $10,000,000 addition to initiate a research and development program focused on developing propulsion, guidance & control, vehicle, ground support, and other technologies that could benefit the commercial launch vehicle industry within the United States.

Section 4(a)(2)(C) also authorizes $289,000,000 in fiscal year 1993 and $359,800,000 in fiscal year 1994 for Launch Services. The authorization for fiscal year 1993 is based on an Administration estimate of $281,000,000 and an increase of $8,000,000. This increase is the combined effect of: a $22,000,000 reduction reflecting the Committee's deletion of funding for the MSAT launch vehicle; and a $30,000,000 addition for the continued development of technologies in support of the commercial launch vehicle industry.

The authorization for fiscal year 1994 is based on an Administration estimate of $315,800,000 and an increase of $44,000,000. This increase is the combined effect of: a $6,000,000 reduction reflecting the Committee's deletion of funding for the MSAT launch vehicle;

and a $50,000,000 addition for the continued development of technologies in support of the commercial launch vehicle industry.

The Committee notes that it questions the accuracy of the estimates for fiscal year 1993 and 1994 given the lack of funding they provide for the purchase of launch vehicles for TDRS-G, AXAF, CRAF, and Lifesats.

This category, formerly "Expendable Launch Vehicles and Services," has been renamed to reflect the fact that pursuant to the Launch Services Purchase Act of 1990 (Title II of Public Law 101–611) NASA will be relying entirely on outside providers for non-Space Shuttle launches, rather than purchasing additional launch vehicles for its own use.

Program description

Funding for Launch Services provides launch services for unmanned civil U.S. government space missions that do not require the Space Shuttle's unique capabilities. Consistent with the Commercial Space Launch Act, Public Law 98–575, as amended, expendable launch vehicle services are to be acquired from the U.S. private sector whenever possible.

Committee view

Deletion of funding for the MSAT Launch Vehicle

The Committee has deleted the funding intended to pay part of the cost of a launch vehicle for the mobile communications satellite (MSAT) planned by the American Mobile Satellite Corporation (AMSC). The Committee notes that a recent U.S. Court of Appeals decision has effectively rescinded the license granted to this corporation by the Federal Communications Commission (FCC). The court found that the FCC was acting at the periphery of its authority and did not demonstrate truly compelling reasons for forcing the applicants for a mobile satellite communications license into a single consortium.

Given this situation, it appears that the FCC will have to reconsider the license applications for mobile satellite service, a process which may take some time. As such, approval of this funding would be premature and the purpose for which this funding is intended may change significantly. Furthermore, the Committee believes that it would be preferable for federal agencies interested in obtaining mobile satellite services to purchase such services directly from AMSC or other providers as required, not through NASA or using funds from NASA's budget. The Committee does not believe that NASA should serve as a federal coordinator for operational services offered by commercial telecommunications firms.

R&D support for Commercial Launch Vehicle Industry

The Committee continues to be concerned with the lack of progress over the past four years in establishing a focused program to develop and expand technologies that would be of value to the commercial launch vehicle industry within the United States.

The Committee has often noted the tremendous value that NASA's research and development initiatives have provided the commercial aircraft industry. These initiatives have been invalu-

able in helping to develop and maintain this key industry as the largest and most dynamic in the world. As such, this industry continues to provide the largest positive contribution to this country's balance of payments than any other industrial sector.

As in the past, the Committee continues to believe that the research and development support that NASA has long provided to the commercial aircraft industry in this country provides an excellent model for the type of support that NASA should provide to the commercial launch vehicle industry.

The commercial launch vehicle industry in this country finds itself at a distinct disadvantage when trying to compete in the world marketplace. In large part, this disadvantage has been due to the research and development and technical support that other countries have provided to their launch vehicle industries.

This Committee believes that NASA should take steps to assist the commercial launch vehicle industry in this country to become more competitive in the world marketplace. To assist in this effort, the Committee has provided funds that could be used to establish a focused program of developing the propulsion, guidance and control, vehicle, ground support and other technologies that could benefit the commercial launch vehicle industry in this country.

The Committee is aware of a study conducted by the Department of Transportation's Commercial Space Transportation Advisory Committee which recommends a similar component technology program. The Committee recommends that this be considered as a basis for the NASA effort. Further close cooperation between NASA and DOT on this issue would be highly beneficial.

Section 4(a)(2)(D) Space and Ground Networks, Communications, and Data Systems

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$953,873,000
1993	1,066,000,000
1994	1,077,500,000
Committee recommendations:	
Fiscal year:	
1992	920,873,000
1993	1,066,000,000
1994	1,077,500,000

Committee authorization recommendation

Section 4(a)(2)(D) authorizes the appropriation of $920,873,000 in fiscal year 1992, $1,066,000,000, in fiscal year 1993, and $1,077,500,000 in fiscal year 1994, for Space and Ground Networks, Communications, and Data Systems. The $33,000,000 general reduction in fiscal year 1992 is without prejudice and may be absorbed by the elimination of the payment to the Federal Financing Bank for the Tracking and Data Relay Satellite System (TDRSS).

Program description

This program provides vital tracking, telemetry, command, data acquisition, communications, and data processing support to meet the requirements of all NASA flight projects. In addition, support

is provied on a reimbursable basis for projects of the Department of Defense, other Government agencies, commercial firms, other countries, and international organizations.

Committee views

Adequacy of funding

The Committee is concerned about this program's ability to adequately support the large number of missions scheduled for the 1990s given the requested budget levels. The delay in the launch of the Earth Observing System and the restructuring of the space station have led some requirements to slip. Nevertheless, the Committee believes that delaying planned improvements of aging and inefficient equipment may threaten NASA's ability to support future space flight missions in a cost-effective manner and result in greater long-term costs for developing and operating ground systems.

Advanced Tracking and Data Relay Satellite

The Committee notes that NASA has taken several positive steps in the fiscal year 1992 budget request. The cancellation of funding for the Tracking and Data Relay Satellite (TDRS) Flight 8 spacecraft and the shift of TDRS Flight 7 to an expandable launch vehicle, actions recommended by this Committee, are particularly noted. At the same time, the Committee notes with concerns that the start of procurement for the Advanced Tracking and Data Relay (ATDRS) has been further delayed.

The Committee views the ATDRS series as an opportunity to establish a more efficient and cost-effective tracking and data relay network. The Committee believes that ATDRS should take advantage of advanced technologies where they promise better performance at lower cost, as long as the technical and programmatic risks are consistent with an operational project. The Committee also believes that the operational nature of the ATDRS series promises significant cost savings. The high reliability of commercial communication satellites procured under fixed-price contracts suggested that this approach might lower the Government's procurements costs. In particular, the Committee notes that the Navy is procuring its UHF Follow-On satellites under a commerical-like contract. The UHF Follow-On contractor will build the satellites under a fixed-price contract, procure launch services, and deliver the satellites to the Navy on-orbit.

The Committee recognizes that high technical risk or the need to make changes to the specifications or design during the development phase would make a cost-plus contract more appropriate. However, the Committee also recognizes that high technical risk and poorly defined performance specifications are incompatible with an operational program. The Committee believes that NASA should not be in the business of engineering operational communications satellites and should, to the extent practicable and reasonable, provide the potential contractors with performance specifications rather than detailed design specifications. Accordingly, the Committee urged NASA to carefully consider the potential advantages of procuring ATDRS under a fixed-price contract. As a minimum, the Committee believes that NASA should consider an ar-

rangement whereby the first ATDRS satellite is procured on a cost-plus basis and additional models procured on a fixed-pricer basis. The Committee also intends that NASA take all possible steps to reduce the time currently planned for evaluating the ATDRS proposals and selecting a contractor. The time currently allotted to this activity appears to exceed what would be considered reasonable and customary for other procurements of operational spacecraft.

Section 4(A)(3) Construction of Facilities

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$480,300,000
1993	469,800,000
1994	541,600,000
Committee recommendation:	
1992	430,300,000

Committee authorization recommendation

Section 4(a)(3) authorizes $430,300,000 for "Construction of Facilities." This authorization represents a $50,000,000 reduction in the Administration's request, reflecting a transfer in that amount from the Advanced Solid Rocket Motor project to the Space Shuttle Production and Operational Capability account. The Committee intends to continue to authorize institutional programs on an annual basis in order to more closely monitor specific expenditures and to ensure that these programs remain responsive to evolving agency needs.

The authorization bill drafted by NASA for fiscal year 1992 reduces the total of the amounts authorized for "Construction of Facilities" by $5,700,000 to $480,300,000 because of expected changes by the administration to the Davis-Bacon Act. NASA's action reflects the President's Budget statement for fiscal year 1992 that endorsed regulatory and legislative reform of the Davis-Bacon Act, including raising the threshold for contracts subject to the Act's provisions from $2,000 to $250,000.

The Davis-Bacon Act of 1931, Public Law 798, 71st. Cong., as amended, requires that construction contracts entered into by any agency of the Federal Government specify minimum wages to be paid to the various classes of laborers and mechanics employed under those contracts. The term "construction" includes direct construction, and the alteration or repair of public buildings and public works, including painting and decorating.

While the Davis-Bacon Act has enjoyed considerable support in Congress since its enactment, Congress has also devoted a significant amount of time to reviewing the Act in the past three decades. Changes to the Act during this time, however, have been minimal.

Accordingly, it is the Committee's intention that if the savings NASA expects from legislative and regulatory changes to the Davis-Bacon Act do not materialize, NASA shall absorb any shortfall from within amounts authorized under section 4(a)(3)(U) through (Y).

Program description

Section 4(a)(3) authorizes appropriations for contractual services for the repair, rehabilitation, and modification of existing facilities to maintain, upgrade, and improve the usefulness of the NASA physical plant; the construction of new facilities and the acquisition of related facility equipment needed to support science, space technology, and aeronautical research; environmental compliance and restoration activities; the design of facilities projects; and advanced planning related to future facilities needs.

The projects and amounts in the budget estimates reflect requirements for Space Station Freedom and Space Flight facilities, including the Advanced Solid Rocket Motor Program, that are time-sensitive to meet certain specific program objectives. Other program requirements for fiscal year 1992 include modernization of the industrial area chilled water system rehabilitation, and expansion of the communications duct banks, and replacement of the 15 kilowatt load break switches at the Kennedy Space Center; repair of the site water system at the White Sands Test Facility; replacement of two central plant chillers and a boiler at the Johnson Space Center; completion of modifications to the X-Ray Calibration Facility in support of the advanced X-Ray Astrophysics Facility (AXAF) at the Marshall Space Flight Center; restoration and modernization of the high voltage distribution system and construction of a data information system facility in support of the Earth Observing System (EOS) program at the Goddard Space Flight Center; modernization of the main electrical substation at the Jet Propulsion Laboratory; continuation of restoration of utilities at the Wallops Flight Facility; projects to repair, restore, and modernize NASA's aeronautical research and development facilities at Ames, Lewis, and Langley Research Centers; and construction of a data interface facility and rehabilitation of the Tracking and Data Relay Satellite System (TDRSS) ground terminal at the White Sands Test Facility in New Mexico.

The fiscal year 1992 program continues to meet the objectives of preserving and enhancing the capabilities and usefulness of existing facilities and ensuring safe, economical, and efficient use of the NASA physical plant. This request continues the necessary rehabilitation and modification program begun in prior years and continues a responsive repair program. The repair program restores facilities to a condition substantially equivalent to their originally designed capability. The minor construction program continues to provide a means to accomplish smaller facility projects which accommodate changes in technical and institutional requirements. The environmental compliance and restoration program ensures that statutory environmental requirements are met and any necessary remedial actions are promptly taken.

Funds requested for facility planning and design cover advance planning for potential future projects, master planning, facilities studies, engineering reports and studies and the preparation of facility project design drawings and bid specifications.

Section 4(a)(4) Research and Program Management

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$2,452,300,000
1993	2,492,600,000
1994	2,495,400,000
Committee recommendation:	
Fiscal year: 1992	2,422,300,000

Committee authorization recommendation

Section 4(a)(4) authorizes $2,422,300,000 for fiscal year 1992. A reduction of $30,000,000 has been made without prejudice and may be absorbed by deferral of those costs associated with moving the NASA headquarters location. The Committee will continue to authorize Research and Program Management on an annual basis.

Section 4(a)(5) Inspector General

President's request for fiscal year 1992 and estimates for subsequent years:	
Fiscal year:	
1992	$14,600,000
1993	15,300,000
1994	15,700,000
Committee recommendations:	
Fiscal year:	
1992	14,600,000
1993	15,300,000
1994	15,700,000

Committee authorization recommendation

Section 4(a)(5) authorizes funding in the full amount of the President's request for activities undertaken by the Inspector General in fiscal years 1992 through 1994.

SECTION 5—CONSTRUCTION OF FACILITIES REPROGRAMMING

Section 5 provides authority to transfer the amounts authorized for specific construction of facilities projects to meet unanticipated cost variations.

SECTION 6—SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES

Section 6 provides authority to transfer funds appropriated for Research and Development, and Spaceflight Control and Data Communications to Construction of Facilities in order to account for new developments or scientific or engineering changes in the national aeronautical and space program.

SECTION 7—CONSIDERATION BY COMMITTEES

Section 7 requires the Administrator to give notice to the appropriate authorizing committees before using appropriations for any program not authorized or for an amount in excess of that authorized.

SECTION 8—SMALL BUSINESS INNOVATION RESEARCH PROGRAM

Section 8 authorizes the Administrator to utilize up to 5 percent of the funds provided for the Small Business Innovation Research Program for program management.

SECTION 9—OFFICE OF FACILITIES MAINTENANCE

Section 9 directs the Administration to create an Office of Facilities Maintenance at NASA that will have complete authority to plan and direct facilities maintenance management for all NASA sites.

Committee views

The Committee has had a long standing interest in the maintenance of NASA's facilities. For example, the Committee vigorously supported NASA's Wind Tunnel Revitalization Program. The Committee often has expressed a need for NASA to properly maintain its facilities in order to meet program objectives. Moreover, when performed on a timely basis, a first class maintenance program can reduce the need for major repairs at a later date.

The Committee congratulates NASA for being forthright and sincere in its testimony before the Committee on March 5, 1991 when Samuel W. Keller, Associate Deputy Administrator, testified for NASA that:

> I certainly would agree that Admiral Truly's comments that the state of our maintenance at the present time is the result of a large number of independent decisions that have been made over the years. (Hearing before the U.S. House of Representatives, Committee on Science, Space, and Technology, March 5, 1991, Transcript at page 63–64.)

The Committee is disappointed, however, with NASA's defense of its present facilities maintenance management structure since that day. There has been no indication from NASA, that it intends to correct the basic problem of elevating the importance of facility maintenance within its management structure.

The Committee strongly believes that the authority and responsibility for facility maintenance should be centralized. Centralizing the authority and responsibility for facility maintenance should improve the condition of NASA's facilities in a short period of time and should be less costly than is currently the case.

The Committee finds NASA's maintenance responsibilities are fragmented throughout five organizations at the Headquarters level: Research and Program Management, three major Program Offices, and Construction of Facilities. However, while NASA's Budget Summaries specify funding for maintenance under Research and Program Management and Construction of Facilities, the Budget Summaries do not specify funding for facility maintenance under the Research and Development Programs.

Furthermore, while there is a Director of Institutions in at least one of the Program Offices, and while there is a competent Director for Facilities within that organization, the degree of authority of that Director is unclear since the authority for expending funds seems to by-pass that person and go directly through to the Center

Director. The December 1990 General Accounting Office's "Report to the Chair, Subcommittee on VA, HUD and Independent Agencies, Committee on Appropriations, U.S. Senate, on NASA Maintenance: Stronger Commitment Needed to Curb Facility Deterioration" contained the following statement on page 21:

> NASA Headquarters has not provided comprehensive guidance to standardize the operation of the centers' maintenance management systems. Consequently, there is no standard maintenance system within NASA, and each center has developed its own approach to plan, budget, schedule, and report on maintenance requirements.

For example, in two of the NASA centers, there are three separate organizations all related to facilities. The Committee is of the opinion that organizational boundaries frequently lead to low morale and poor performance. Finally, at the Centers, institutional facility maintenance is included with security services, janitorial services and expenditures for utilities.

In the opinion of the Committee, the age of NASA's facilities require somewhat higher investments in maintenance that has been made in the past. However, the Committee cannot, in good conscience, recommend any increase unless and until NASA establishes one single office at the Headquarters level accountable for and with the authority to develop and direct an effective facility maintenance program throughout NASA. The Committee looks forward to the appointment of a qualified individual to direct this program early in FY 1992.

SECTION 10—COMMERCIAL SPACE LAUNCH ACT AMENDMENT

Section 10 authorizes the appropriation of $5,104,000 in fiscal year 1992 for the Office of Commercial Space Transportation. This amount is identical to the President's request for this office. In addition, Section 10 authorizes such sums as may be necessary, up to $20,000,000, for improvements to space transportation infrastructure.

Committee views

Improvements to Space Transportation Infrastructure

The Committee views with great concern the current condition of our nation's space transportation infrastructure, including launch sites and launch site support facilities. In many cases nationwide, equipment and facilities have not been adequately upgraded or maintained as required over the last decade. At many launch sites, the use of sandbags is necessary to support some blockhouse walls during launches. In addition, much of the electronic and other equipment in launch control centers is outdated.

The Committee supports improvements to the nation's space transportation infrastructure. Such improvements would make the existing launch sites safer, in addition to improving the nation's position in the international space launch marketplace.

The Commercial Space Launch Act, as amended in 1990, requires the Secretary of Transportation to facilitate and promote public-private partnerships involving the federal government, state gov-

ernments, and the private sector to build, expand and modernize the nation's space launch infrastructure. In addition, the Committee believes that funds should not be secured from the Transportation Research and Development accounts.

SECTION 11—NATIONAL SPACE COUNCIL AUTHORIZATION

Section 11(a) authorizes the appropriation of $1,491,000 in fiscal year 1992 to carry out the activities of the National Space Council established by section 501 of the NASA Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471).

Section 11(b) expresses the sense of Congress that the National Space Council should develop policy recommendations for the follow-on program to Landsat 6.

SECTION 12—OFFICE OF SPACE COMMERCE AUTHORIZATION

Section 12 authorizes the appropriation of $491,000 in fiscal year 1992 for the Office of Space Commerce.

SECTION 13—AMENDMENT OF PUBLIC LAW 100-147

Section 13 requires NASA to annually provide in the Capital Development Plan estimated costs from the space station in then year and constant dollars for at least the first full year of steady operations. This action will aid the Congress in assessing NASA's ability to not exceed ten percent of its total budget for operating costs and in assessing the impact of design trade-off decisions.

SECTION 14—MULTIYEAR CONTRACTING

Section 14 requires the NASA Administrator to study the multiyear contracting authority used by the Department of Defense and the potential application of similar authority to NASA contracting. The Committee intends that candidate programs submitted with the study for consideration by Congress by substantive development programs of the agency.

SECTION 15—BUY AMERICA PROVISIONS

Section 15 contains certain provisions relating to the purchase of U.S. manufactured products. Included are: certain restrictions on contract awards for items from countries which have a pattern of discrimination against U.S. products; a prohibition against fraudulent use of "Made in America" labels; and general guidelines on procuring U.S. manufactured goods.

SECTION 16—QUALITY ASSURANCE PERSONNEL

Section 16 prohibits the exclusion of quality assurance personnel from work sites of persons providing articles to NASA.

SECTION 17—NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ENDEAVOR TEACHER FELLOWSHIP TRUST FUND

Section 17 establishes a trust fund to provide fellowships to U.S. nationals pursuing a course of study leading to certified teaching degrees.

SECTIONAL ANALYSIS

A bill to authorize appropriations to the National Aeronautics and Space Administration for Research and Development; Space Flight Control, and Data Communications; Construction of Facilities; Research and Program Management; the Inspector General; and for other purposes.

SECTION 1—SHORT TITLE

Section 1 designates that the act may be cited as the "National Aeronautics and Space Administration Multiyear Authorization Act of 1991".

SECTION 2—FINDINGS

Section 2 includes eleven findings based upon hearings on the Advisory Committee on the future of the U.S. Space Program and authorization hearings.

SECTION 3—POLICY

Section 3 includes five policy statements intended to guide the formation of a balanced space program.

SECTION 4—AUTHORIZATION OF APPROPRIATIONS

Section 4 authorizes appropriations for fiscal year 1992, 1993, and 1994 for all NASA's research and operational programs.

SECTION 5—CONSTRUCTION OF FACILITIES REPROGRAMMING

Section 5 provides authority to transfer the amounts authorized for specific construction of facilities projects to meet unanticipated cost variations.

SECTION 6—SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES

Section 6 provides authority to transfer funds appropriated for Research and Development, and Spaceflight Control and Data Communications to Construction of Facilities in order to account for new developments or scientific or engineering changes in the national aeronautical and space program.

SECTION 7—CONSIDERATION BY COMMITTEES

Section 7 requires the Administrator to give notice to the appropriate authorizing committees before using appropriations for any program not authorized or for an amount in excess of that authorized.

SECTION 8—SMALL BUSINESS INNOVATION RESEARCH PROGRAM

Section 8 authorizes the Administrator to utilize up to 5 percent of the funds provided for the Small Business Innovation Research Program for program management.

SECTION 9—OFFICE OF FACILITIES MAINTENANCE

Section 9 directs the Administration to create an Office of Facilities Maintenance at NASA that will have complete authority to plan and direct facilities maintenance management for all NASA sites.

SECTION 10—COMMERCIAL SPACE LAUNCH ACT AMENDMENT

Section 10 provides budget authority for the Office of Commercial Space Transportation.

SECTION 11—NATIONAL SPACE COUNCIL AUTHORIZATION

Section 11(a) provides budget authority for the National Space Council, established by section 501 of the NASA Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471).

Section 11(b) expresses the sense of Congress that the National Space Council should develop policy recommendations for the follow-on program to Landsat 6.

SECTION 12—OFFICE OF SPACE COMMERCE AUTHORIZATION

Section 12 provides budget authority for the Office of Space Commerce.

SECTION 13—AMENDMENT OF PUBLIC LAW 100-147

Section 13 requires NASA to annually provide in the Capital Development Plan estimated costs from the space station in then year and constant dollars for at least the first full year of steady operations.

SECTION 14—MULTIYEAR CONTRACTING

Section 14 requires the NASA Administrator to study the multiyear contracting authority used by the Department of Defense and the potential application of similar authority to NASA contracting.

Committee Recommendations

A quorum being present, on April 24, 1991, the Committee favorably reported the bill H.R. 1988 by voice vote and recommends its enactment.

Committee Cost Estimate

No cost estimate by the Congressional Budget Office pursuant to section 403 of the Congressional Budget Act of 1974 and rule XI, clause 2(l)(1)(A)(3) of the Rules of the House of Representatives was available at the time of this report. In accordance with the requirements of section 252(b) of the Legislative Reorganization Act of 1970 and pursuant to Rule XIII, clause 7 of the House of Representatives, the Committee provides the following cost estimate to the Federal Government:

[By fiscal year, in millions of dollars]

	1992	1993	1994	1995	1996
Authorization of appropriations:					
NASA	14,938	10,774	11,022	.....	.....
OCST	5	.....	.....	.....	.....
Office of Space Commerce	(1)	.....	.....	.....	.....
National Space Council	1	.....	.....	.....	.....
Total	14,945	10,774	11,022	.....	.....

The costs of this bill would be in budget functions 250, 370, 400, and 800.

Basis of estimate: This estimate assumes that the full amounts authorized would be appropriated for each fiscal year.

Effects of Legislation on Inflation

In accordance with rule XI, clause 2(l)(4) of the Rule of the House of Representatives this legislation is assessed to have no adverse long-run inflationary effects on prices and cost in the operation of the national economy. NASA expenditures are labor intensive, with approximately 80 percent of spending directly for jobs and the remainder for materials. In fiscal year 1991, NASA will employ about 23,829 civil servants and support about 199,000 contractor and support services employees. Assuming a multiplier effect of 2.5, the total short-run employlment effect on the United States' economy in fiscal year 1990 is about 557,000 jobs. In fiscal year 1992, NASA will employ 24,197 civil servants and support about 217,000 contractor and support services employees. Assuming a multiplier effect of 2.5, the total short-run employment effect on the United States economy in fiscal year 1991 is about 603,000 jobs. This represents less than one-half of one percent of the total civilian labor force in the United States—too small to have a significant national effect. There could be some specific cases of industrial and regional employment and price changes influenced by NASA expenditures.

The most significant economic effects of NASA spending is the long/run productivity advance from new technologies developed for the space and aeronautics programs. Many NASA-sponsored advances in air and space transportation, communication satellites, remote sensing satellites, and other innovations have improved the productive capacity of industry and stimulated the development and growth of many new businesses.

NASA is actively pursuing its role to expand the opportunities for private industry to gain access into space effectively and economically use space for commercial ventures. These expanded business opportunities have stimulated and are expected to continue to stimulate more productive, non-inflationary private sector economic growth, job creation and improve the United States competitive economic position in the world, e.g., improve United States trade balance.

CHANGES IN EXISTING LAW MADE BY THE BILL AS REPORTED

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

SECTION 24 OF THE COMMERCIAL SPACE LAUNCH ACT

AUTHORIZED APPROPRIATIONS

SEC. 24. There are authorized to be appropriated to the Secretary $4,000,000 for fiscal year 1985. There is authorized to be appropriated to the Secretary to carry out this Act $586,000 for fiscal year 1986. There is authorized to be appropriated to the Secretary to carry out this Act $4,548,000 for fiscal year 1988. There is authorized to be appropriated to the Secretary to carry out this act $3,827,000 for fiscal year 1989. There are authorized to be appropriated to the Secretary to carry out this Act $4,517,000 for fiscal year 1991, of which $250,000 shall be made available for the provision of launch services for eligible satellites in accordance with section 6 of the Commercial Space Launch Act Amendments of 1988. *There are authorized to be appropriated to the Secretary to carry out this Act $5,104,000 and such additional sums as may be necessary, not to exceed $20,000,000, to ensure the resiliency of the Nation's space infrastructure, for fiscal year 1992.*

SECTION 107 OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 1988

SEC. 107. (a) For each of the fiscal years 1989 through 1996, the Administrator, along with the President's submission to the Congress of the annual budget request for the National Aeronautics and Space Administration, shall submit a capital development plan for the space station program. Each such plan shall include the estimated cost, *in both then year and constant dollars,* of all direct research and development; space flight, control and data communications; construction of facilities; *assembly (including related costs);* and research and program management for the fiscal year involved and the two succeeding fiscal years. *Each such plan shall also include the estimated cost, in both then year and constant dollars, of operations for at least the first full year of steady operations of the space station.*

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COMMITTEE OVERSIGHT FINDINGS AND RECOMMENDATIONS

Pursuant to rule XI, clause 2(l)(3) of the Rules of the House of Representatives, and under the authority of rule X, clause 2(b)(1) and clause 3(f), the Committee has incorporated in the present bill and report its findings and recommendations resulting from the Committee's oversight activities.

Oversight Findings and Recommendations of the Committee on Government Operations

No findings or recommendations on oversight activity undertaken pursuant to rule X, clause 2(b)(2), and rule XI, clause (2)(l)(3) of the Rules of the House of Representatives have been submitted by the Committee on Government Operations for inclusion in this report.

Budget Act

The bill provides for new authorization rather than new budget authority and consequently the provisions of section 308(a) of the Congressional Budget Act are not applicable.

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